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COMMERCIAL FISHERIES REVIEW

VOL. 10, No. 5 MAY 1948

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Washington, D.C.

UNITED STATES
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FISH AND WILDLIFE SERVICE
ALBERT M DAY, Director

COMMERCIAL FISHERIES REVIEW

A REVIEW OF DEVELOPMENTS AND NEWS OF THE FISHERY INDUSTRIES
PREPARED IN THE BRANCH OF COMMERCIAL FISHERIES

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COURTESY OF DAILY NEWS, ST. JOHN'S, NFLD.

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COMMERCIAL FISHERIES REVIEW

May 1948 Washington 25, D.C. Vol. 10, No. 5

COORDINATED PLANS FOR MANAGEMENT OF THE FISHERIES OF THE PACIFIC COAST

PREPARED BY THE RESEARCH DEPARTMENTS OF THE CALIFORNIA DIVISION OF FISH AND GAME, THE WASHINGTON DEPARTMENT OF FISHERIES, AND THE OREGON FISH COMMISSION*

INTRODUCTION

At the meeting of the Pacific Marine Fisheries Commission on January 19 and 20, 1948, the research departments of the three Pacific Coast States were requested to confer at an early date and, after a discussion of the fisheries problems, prepare a written report to be submitted to the Commission prior to the next meeting on April 5 and 6, 1948.

Certain men actively engaged in the various fisheries research programs were chosen to meet with biologists of the other State agencies. This group was to discuss the fisheries problems and jointly compile a report including the basic known data and the requirements necessary for a successful management program for each fishery.

Biologists, representing the staffs of the three Pacific Coast States, met in San Francisco on February 17, 18, and 19, 1948, for this purpose. Biological knowledge was interchanged; existing and proposed programs of study were discussed; present regulations were compared; and future coordinated programs were drawn up in order to fulfill the directives from the Commission. With a few notable exceptions, sufficient knowledge is not available to warrant a change in existing regulations. Programs were drawn up with two views in mind. First, a complete program is presented of the necessary magnitude to rapidly and efficiently arrive at a practical management plan encompassing all phases of the fisheries. But, it is realized that, for the present, sufficient funds are not available to inaugurate large-scale studies on many of the fisheries. Second, the group recommended coordinated research studies on a much smaller scale possible with the present staffs and funds.

With certain of the fisheries--such as tuna--a greatly expanded program will be necessary if results are to be expected within a relatively short time. Unfortunately, most biological research of real value is based on relatively long periods of uninterrupted study.

It should be understood that the problem of properly regulating the harvest of any fisheries must be based on certain fundamental knowledge. It is necessary, when a coordinated conservation program for widely separate areas is considered, to not only thoroughly understand the inter-relationships of the separate or contiguous fisheries, but to obtain basic knowledge necessary throughout the range of the fishery to properly regulate the yield. Before any fishery can be properly managed to obtain constantly the maximum yearly harvest, a number of fundamental concepts must be evaluated:

1. The life history of the fish including a knowledge of the growth, age, and maturity.

2. The habits of the fish, including the range of migration.

Excerpted from a 103-page report submitted to the Pacific Marine Fisheries Commission, San Francisco, Calif., April 5-6, 1948.

3. The effects of the existing fishery on the populations, which includes the loss due to fishing.

4. The losses due to natural causes throughout the life of the fish.

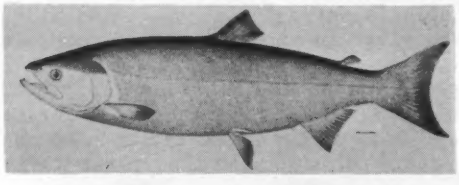
Woven into this pattern must be a knowledge of the rate of replacement by the young and the effects of environmental conditions such as ocean currents, foods, and temperatures on the migrations or availability of the fish. Many times, levels of abundance most suitable from a scientific standpoint are not in harmony with the economic levels of harvest. Then, adjustments must be made to allow for the most economic utilization of the resource by diverting the catch into channels yielding the greatest benefit. Thus, it can be seen that for adequate control and fisheries conservation, considerable effort must be expended to base regulation on facts.

The various sections presented in this report were prepared by study groups of specialists from each State concerned in the research on these fisheries for their respective States. All fisheries are not included in the discussions. Only those problems of concern to two or more of the three States participating in the Compact were discussed and are reported. It is believed that all fisheries of important mutual concern are included.

SUMMARY

The salient features regarding each fishery have been summarized and only the more important phases are gathered together here for consideration.

Salmon



BLUEBACK, RED, OR SOCKEYE SALMON

Although a great many investigations have been made of the salmon inhabiting the rivers of the Pacific Coast, there is relatively little known of the ocean behavior of salmon and the factors at sea which affect their survival. Investigations of the ocean troll fishery have been limited in scope, and until recently, practically no restrictions were placed on the ocean salmon fisheries.

Troll Fishery Regulations, Washington, Oregon, and California

Item	Minimum Total Length (inches)		Open Season	
	Chinook	Silver	Chinook	Silver
Washington	27	18	All year	July 1 - Nov.15
Oregon	27	None	" "	July 1 - Nov.15
California	25	25	Apr. 1 - Sept.15	Apr. 1 - Sept.15

The basis for all management studies are adequate records from the fishery; with minor exceptions, these records are available for the commercial fishery, but are as yet wholly inadequate for the sports fishery.

Estimated Sport Catch of Salmon, 1946

Item	Washington	Oregon	California 1/
	Number	Number	Number
Chinook	83,000	43,000	-
Silver	142,000	21,000	-
Total	225,000	64,000	306,000

1/ Not broken down by species.

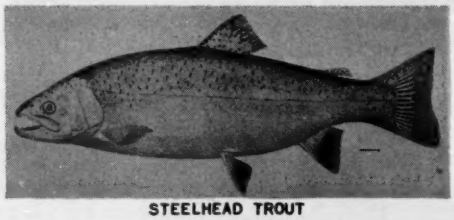
Gigantic water-development programs are proposed for all major river basins along the Pacific Coast. These pose tremendous obstacles in the maintenance of anadromous fish runs. In the case of the salmon resources, large hatcheries for artificial propagation are proposed to take the place of the natural rearing areas. Present hatchery methods have not proved successful enough to warrant optimism over this measure of amelioration. In general, unless artificial propagation increases greatly in efficiency and larger hatcheries become economically feasible the salmon resources cannot be maintained.

Moves are underway to eliminate the commercial fishing from the bays and river estuaries along the Pacific Coast. The salmon at maturity, when entering the rivers are at the prime marketable condition. Because of the many known factors adversely affecting salmon in fresh water and as yet uncorrected, and because of the many as yet unknown features of the ocean life of the salmon, it is believed that through an active coordinated management program, the salmon runs can be maintained at high levels of productivity without the elimination of a valuable industry. The suggested closure of the California inland salmon fishery has no logical basis. The escapement into the Sacramento-San Joaquin River systems has been particularly heavy during recent years, and a heavier harvest, providing the populations remain at present high levels, of these stocks of salmon would be a sound conservation measure.

Cooperative studies of the ocean salmon fishery and the exchange of pertinent information on other phases of the salmon problems will begin immediately among the three Pacific Coast States.

Steelhead

The steelhead is the most widely distributed of the anadromous salmonids. Probably little intermingling of the stocks takes place between the three States, except in the Columbia River system.



STEELHEAD TROUT

Steelhead are similar to salmon except that they spawn more than once, and, in general, the problems involved in maintaining the steelhead runs are identical to those for salmon.

At the present time, steelhead are taken in large quantities by the recreational fishermen in California, Oregon, and Washington, but only in Oregon may they be taken commercially.

Although the steelhead sports regulations vary from State to State, in general, bag limits and seasons during the year are used to limit the take and protect the fish. No limit is placed on the total number of steelhead that can be taken, only the individual fisherman is limited. Ideally, only the annual production from a stream system should be taken.

Otter Trawl

More than 20 species of fish are included in otter trawl landings. The more important species are: the English, petrale, dover, and sand soles, the dogfish shark, several species of rockfish, black cod, lingcod, and flounders.

PACIFIC COAST SHARK LANDINGS BY STATE
(CALCULATED FROM LIVER POUNDAGES)

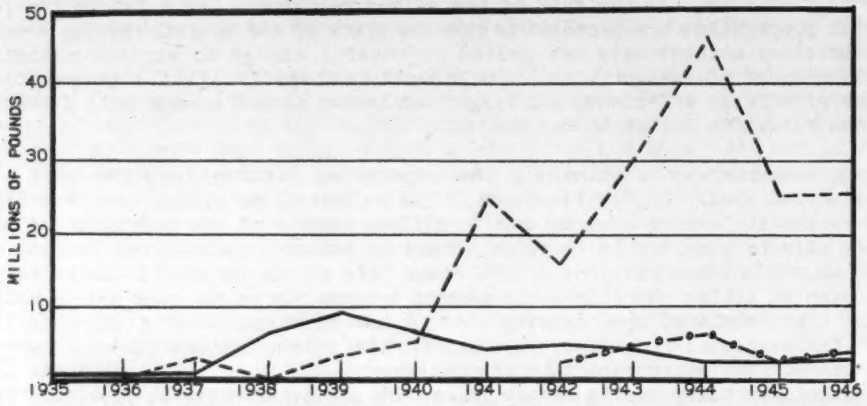
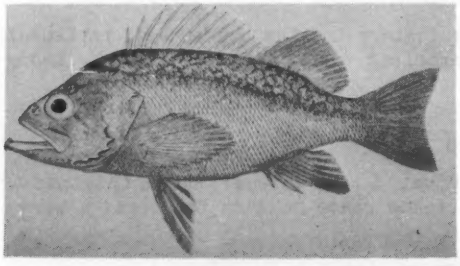


FIGURE 1



ORANGE ROCKFISH

The soupfin shark fishery has been shown to be declining rapidly all along the coast until now it is hardly profitable. Since evidence is available that the soupfin migrate freely all along the Pacific Coast, coordinated regulations are necessary to rehabilitate the stocks.

Evidence is available that the populations of most of the valuable sole and flounders have been declining because of increased fishing intensity. Data is not yet available as to the intermingling of the stocks of bottom fish.

PACIFIC COAST BOTTOM FISH LANDINGS BY STATE
(LESS HALIBUT, SHARK, AND CRAB)

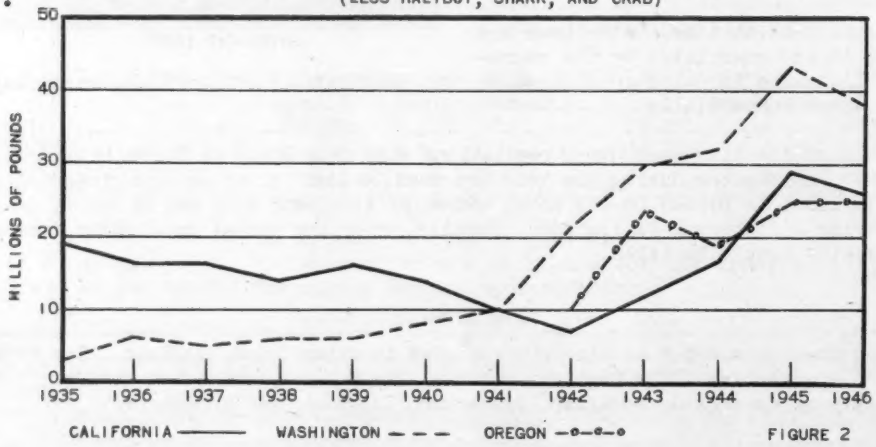


FIGURE 2

Otter trawl net mesh experiments in both California and Washington showed the advantages of using a 5-inch mesh net over a smaller mesh in the added escapement of the younger immature fish. This corresponds with similar results on the East Coast of the United States and in Europe.

A coordinated program designed to place into action a management plan along the entire coast is proposed as well as a suggested immediate cooperative program.

Tuna

Albacore fishing has violently fluctuated and suggests fishing is not fully exploiting stocks.

The American albacore may be a different stock from the Japanese and Hawaiian albacore.

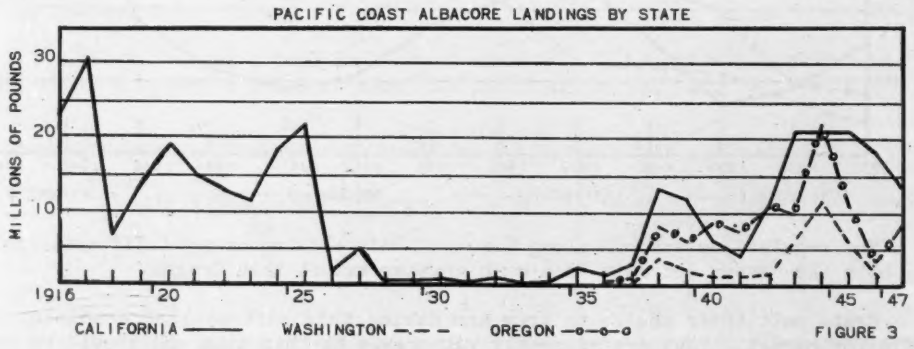


FIGURE 3

In general, the Pacific Coast fishery occurs on two size groups in most years, and the northern and southern fishery are fishing at about the same time of the year on the same size group. The fish are landed primarily in July, August, September, and October; the poor landings in some years appear to be due to the absence of one or the other or both size groups from the inshore fishing area.

BUCKET OF FISH WITH APPROXIMATELY 600 LBS. OF YELLOWFIN TUNA BEING SWUNG TO RECEIVING TROUGH OF DECK. CHAIN ON BOTTOM OF BUCKET USED IN DUMPING. WEIGHING SHED IN RIGHT BACKGROUND.

The Japanese have two albacore fisheries, one occurring in inshore waters much as our present fishery; the other and larger Japanese fishery occurs about 2,000 miles offshore. The possibility comes to mind whether or not stocks do not occur in offshore waters of the Pacific Coast.

Coordinated studies on tuna will entail a large sum of money, considerable staff, and several years. Exploratory work offshore and experimental fishing as well as biological work is suggested. A tentative budget of $500,000 outlay and an annual operating budget of $150,000 for several years are suggested.

An immediate limited program for coordinated studies with the present limited staff is presented.

Crabs

A tremendous increase has occurred in the crab landings along the Pacific Coast in the past 10 years. This fishery lands over one million dozens of crabs annually and the catch is still increasing.

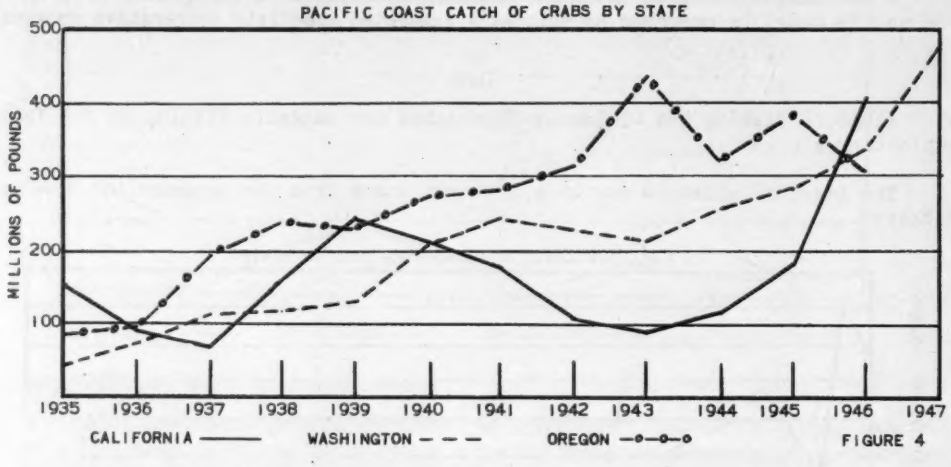


FIGURE 4

The regulations vary all along the coast with Washington and California limiting both the season and size to a much greater extent than Oregon.

Crabs molt their shells to grow and during this soft-shelled condition are unfit for market. They are extremely vulnerable at this time and should be protected. The molting season varies all along the coast due to differences in the oceanographic conditions, and therefore, the season necessarily varies from State to State. The present size limit varies considerably between the three States with California's limit considerably greater than either of the other two States. Over 2 years of study have provided the State of Washington with adequate basis for regulation of the crabs. Both California and Oregon are beginning to evaluate the effects of the fishery on the crabs and will re-adjust their regulations after data are obtained.

DUNGENESS CRAB

Anchovy

This fishing is still a minor fishery but promises to develop within the next few years. An expansion has already occurred in California, especially since the failure of the sardine catch.

The northern anchovies are being canned at the present time in California.

Few laws protect the anchovy at the present time; they may be used for food or for bait, but not for reduction.

Little biological work has been done on the northern anchovy, and the full extent of the available unexploited stocks are not known.

Preliminary scale examination in California indicates this fish is not a long-lived fish; probably living to a maximum of 5 or 6 years in California.

No good record is being kept of the catch along the coast; the portion of the catch used for bait for tuna boats is unknown at the present time.

This is a forage fish and is used extensively by other desirable species for food.

Sardines

This fishery extends from British Columbia to Mexico, and the fish are primarily reduced into oil and meal with substantial quantities canned.

The catch reached a peak in 1936-37 when 790,000 tons were taken and has declined to a probable catch of about 100,000 tons in 1947-48.

Seasonal Catch of Sardines Along the Pacific Coast

Season 1/	British Columbia	Washington	Oregon	Total Pacific NW	Total Calif.	Grand Total	Calif. Percent of Total
	Tons	Tons	Tons	Tons	Tons	Tons	
1916-17	-	-	-	-	27,530	27,530	100
1917-18	80	-	-	80	72,580	72,660	100
1918-19	3,640	-	-	3,640	75,540	79,180	95
1919-20	3,280	-	-	3,280	67,030	70,310	95
1920-21	4,400	-	-	4,400	38,450	42,850	90
1921-22	990	-	-	990	36,500	37,490	97
1922-23	1,020	-	-	1,020	65,110	66,130	98
1923-24	970	-	-	970	83,930	84,900	99
1924-25	1,370	-	-	1,370	173,020	174,390	99
1925-26	15,950	-	-	15,950	137,270	153,220	90
1926-27	48,500	-	-	48,500	152,210	200,710	76
1927-28	68,430	-	-	68,430	187,260	255,690	73
1928-29	80,510	-	-	80,510	254,484	334,994	76
1929-30	86,340	-	-	86,340	325,170	411,510	79
1930-31	75,070	-	-	75,070	185,120	260,190	71
1931-32	73,600	-	-	73,600	164,650	238,250	69
1932-33	44,350	-	-	44,350	250,680	295,030	85
1933-34	4,050	-	-	4,050	383,440	387,490	99
1934-35	43,000	-	-	43,000	600,020	643,020	93
1935-36	45,920	10	26,230	71,560	560,500	632,060	89
1936-37	44,450	6,560	14,200	65,210	726,100	791,310	92
1937-38	48,080	17,100	16,660	81,840	416,530	498,370	84
1938-39	51,770	26,480	17,020	95,270	575,260	670,530	86
1939-40	5,520	17,760	22,330	45,610	542,250	587,860	92
1940-41	28,770	810	3,160	32,740	460,580	493,320	93
1941-42	60,050	17,100	15,850	93,000	587,370	680,370	86
1942-43	65,880	580	1,950	68,410	504,660	573,070	88
1943-44	88,740	10,440	1,820	101,000	478,130	579,130	83
1944-45	59,120	20	-	59,140	554,910	614,050	90
1945-46	34,300	2,310	90	36,700	403,680	440,380	92
1946-47	3,990	6,140	3,960	14,090	233,600	247,690	94

1/ Each season includes June through the following May.

Note: These records have been supplied by the governments of Canada, Wash., Ore., Calif., and the U. S. Fish and Wildlife Service.

Studies have demonstrated that all fisheries along the Coast are derived from the same population, and fisheries on various grounds place a drain on the common supply.

The fish migrate north in the late spring and summer from California and south in the fall and winter to spawn mainly in southern California.

The Canadian and California fisheries agencies and the U. S. Fish and Wildlife Service have carried on extensive biological investigations of the sardine and Oregon and Washington to a lesser degree. All investigations are coordinated at the present time.

The complete failure of the fishery during the past two years has caused a serious crisis in the industry, largely centered in California.

It is believed that heavy fishing intensity, coupled with a poor survival from spawning have reduced the populations to a dangerously low level. This may also be reflected in other fisheries using the sardines for food. Management of the fisheries should not be delayed and should be based on a control of the annual landings.

Shad

The shad fisheries of the three Pacific Coast States produce about 3,000,000 pounds each year, valued at nearly $1,000,000.

Present regulations on the fishery primarily protect salmon and steelhead in Washington and Oregon and the striped bass in California.

The fishery is confined to the time of the spawning migration.

If the proposed elimination of netting on California inland waters succeeds, the shad fishing will cease to exist.

Striped Bass

An important sports fishery for this introduced species exists in California and Oregon, with a commercial fishery landing about 200,000 pounds annually existing in Oregon.

Comprehensive studies are underway in California along broad management lines. Work in Oregon is being confined to food studies to determine whether this fish is a serious predator on young salmon.

Oysters

The oyster industry has expanded rapidly since the first introduction of Japanese oysters early after the turn of the century. The annual harvest is now valued at approximately $5,000,000 to the growers.

A problem of mutual concern is the danger of introducing serious oyster diseases and predators. These have already been introduced into Washington and have ruined much valuable land.

Present adequate laws are in effect in California and slightly less stringent regulations control the introduction and transfer of oysters in Washington. No restrictions limit the introduction or spread of diseases and pests in Oregon.

Latent Fisheries

Most biologists familiar with the Pacific fisheries agree that there are considerable undeveloped fisheries along the Coast. To develop these resources will entail considerable exploratory research at a considerable expense.

Statistics

The basis for all fisheries management is comprehensive and accurate records of the fishery; both the landings of the various species and the amount of fishing necessary to make such catches.

It was agreed that certain basic data was necessary in order to have adequate statistical records for management. Certain phases of the necessary data is not uniformly available in all three States and recommendations for correcting this inadequacy were suggested.

Oceanography

Eventually a program of physical and chemical oceanography will be necessary to explain the occurrences and define the limits, availability, and movements of the fisheries resources of the Pacific Ocean. Maximum utilization of the resources of the sea will be possible only after an understanding of the environmental conditions.

RECOMMENDATIONS

General

While specific recommendations follow each section of the report, the following are the salient features of the proposals suggested for cooperative studies and coordinated management of the Pacific Coast fisheries.

Long-term studies are recommended for salmon, tuna, otter trawl, and crab fisheries. To accomplish these broad programs, encompassing all necessary aspects of fisheries management, within a reasonable span of time more funds for an expanded staff and additional equipment must be made available.

Cooperative programs are, however, recommended for all the above-mentioned fisheries, based on the limited funds and personnel now available to the three State agencies.

Our latent fisheries must be developed; first, by locating new methods of fishing and new locations where fish are found in commercial quantities; and second, by developing with the use of technological research methods of marketing little utilized species occurring in quantities in this section of the Pacific.

It is further recommended that studies of the ocean waters be carried out to determine the factors influencing the movements, occurrences, success of reproduction, and survival of fish in the ocean.

Specific

It is recommended that:

1. A more effective stream improvement plan be placed into effect on a coast-wise basis, including improvement of spawning areas, removal of barriers, elimination of serious pollution blocks, effective laddering of natural and artificial obstructions, and the screening of diversions.

2. A study of methods of the evaluation of the fisheries resources, especially salmonoid fish, possibly with the aid of a competent economist be made.

3. An immediate study of the salmon troll fishery along the California-Oregon boundary be conducted with the objective of adjusting regulations to make them uniform in a single fishing area.

4. Regulated commercial and sport salmon fisheries be maintained on the inland waters of the Pacific Coast where studies indicate the resources can permit an annual harvest or where other controllable and correctable factors are the primary cause of the decline.

5. The legal status of the rights of the fisheries resources to an adequate water supply be ascertained.

6. Coordinated and uniform regulations of steelhead fisheries on the main stream of the Columbia River for both sports and commercial fisheries be formulated.

7. Free exchange of data being collected by each state on all fisheries will hasten conservation plans and prevent duplication of effort.

8. The tuna fishery not be curtailed now, but exploratory studies to further increase the range of the fishery and the yield be made.

9. The maximum utilization of the anchovy not be hurried because of the importance of this fish as food for other larger fish.

Improvements in Statistics

It is recommended that:

1. All three states inaugurate boat catch records and methods of measuring improvements in efficiency of fishing where not now in effect. Both are essential tools in analyzing catch records.

2. Each state provide a record of the gear used and the locality of catch on the individual boat trip ticket. The area caught be recorded by using the serially numbered block area system already accepted by the three states.

3. Each state adopt a list of official common names for that State of all fish caught with accompanying scientific names so all may know what fish is referred to. These lists be exchanged before adoption so that uniformity may be accomplished wherever possible.

4. Each state number its boats, licensed in that state, and each number remain with the boat indefinitely. Numbering systems between states would remain separate; boats fishing in two states would have two boat numbers. The boat numbers would accompany other information on each landing report.

5. Each state publish summaries of the fish catch by calendar year and by monthly figures.

Changes in Regulations

It is recommended that:

1. One year after adoption by the States of Washington and Oregon, a minimum size regulation for otter trawl nets of five-inch mesh, measured from the center of knot to center of knot, be placed into effect.

2. Sink gill nets be made illegal gear in the ocean and bays for use in capturing sharks, and certain other fish, to protect the dwindling supplies of soupfin sharks. The regulation to become effective eighteen months after enactment.

3. A closed season for soft-shelled crabs be enacted in Oregon during 1948 after the appearance of numbers of molting crabs. The seasons need not be uniform along the coast or perhaps even within the states, but should fully protect the crabs during the molting period.

4. Oregon consider adjusting its minimum size limits on crabs after completion of present studies on age and growth of Oregon crabs. Data from Washington indicate a greater size limit may ultimately increase the annual yield.

5. Although an effective organization for coordinated studies of the pilchard fishery now exists, it is agreed after a study of the data that management of the sardine or pilchard fishery not be delayed.

6. The State of Oregon require inspection of all oysters and other marine or fresh water exotic species from being transferred in or out of the State as well as within the State to prevent the introduction or spread of undesirable diseases, pests or species of fish or shellfish.

7. Washington revise its oyster inspection law to cover the introduction of any exotic marine forms whatsoever, patterned after the California law.

FREEZING FISH AT SEA

Fish should be considered a food even more perishable than agricultural products, since it is adjusted to temperatures generally lower than the atmosphere. Fish is either killed in catching or shortly thereafter and, as dead tissue, is subject to enzymatic breakdown which is doubled for each 10° F. increase in temperature. To duplicate the practices applied to other food products it is necessary to freeze fish immediately after they are taken from the water. The merits of this procedure have been under discussion among the commercial producers of fish for a number of years. In some segments of the industry it is an accomplished practice--in others no satisfactory solution for the many accompanying problems has been devised.

--Fishery Leaflet 278

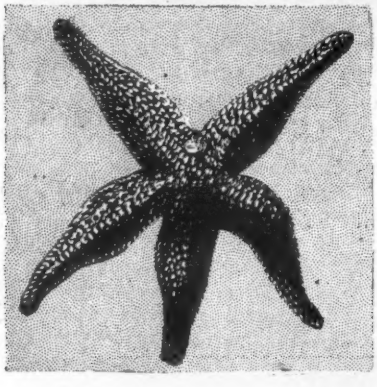
TECHNOLOGICAL STUDIES OF THE STARFISH

PART IV—THIAMINASE IN STARFISH

By Charles F. Lee*

INTRODUCTION

The first two papers of the series of technological studies on the common starfish (Asterias forbesi) of the Atlantic Coastal waters, discussed its ecological relation to the oyster and review data on the chemical composition of fresh starfish and starfish meal. The third paper discussed data from feeding tests of starfish meal as a protein supplement for growth of rats and chicks and for egg production.



The present paper presents the data of the biological tests from which it was concluded that the starfish contained thiaminase, the thiamine-destructive enzyme.

The presence of thiaminase in starfish has already been mentioned in connection with the protein feeding tests reported in the preceding paper of this series, as a factor affecting growth of certain groups of chicks (Lee, 1948-B). It has also been reported in a review paper on thiaminase (Lee, 1948-A). This review summarized information in the literature on the properties of thiaminase, its distribution in the different organs and the various species of fish, and also presented a critical discussion of the numerous contradictions regarding the enzyme that are to be found in the literature. No general discussion of thiaminase will be included herein, other than that which seems to be demanded by the present study of thiaminase in starfish.

REVIEW OF LITERATURE

The existence of a substance in fish which actively destroyed thiamine was first proven in 1941, although several years earlier, an investigation of a number of outbreaks of paralysis of foxes had traced the cause to a thiamine deficiency, and implicated fish as the dietary factor responsible for it.

It was eventually concluded that the destructive substance was an enzyme, heat labile at the temperature of boiling water, and separating on dialysis into

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NOTE: Part I of this series, "Starfish Control--Its Economic Necessity and Methods Used," appeared in the January 1948 issue of Commercial Fisheries Review, pp. 1-6. Also available as Sep. No. 193.

Part II, "Chemical Composition," appeared in the February 1948 issue, pp. 11-18. Also available as Sep. No. 196.

Part III, "Value of Starfish Meal--Protein Supplement for Growth of Rats and Chicks and for Egg Production," appeared in the March 1948 issue, pp. 8-19. Also available as Sep. No. 199.

two components of different destructive activity. It is perhaps more accurate to state that the enzyme renders thiamine biologically inactive or unavailable, rather than to refer to its destruction. One process of destruction has been demonstrated to be a hydrolytic splitting of the molecule into its two heterocyclic components, generally referred to as the thiazole and pyrimidine fractions.

It is interesting to note that thiaminase has chiefly been found in what may be broadly called "aquatic animals." All early reports recorded its presence only in fresh-water fish, with the exception of the Atlantic herring. In fish, the greatest concentrations of thiaminase are in the viscera, but it is also widely distributed in the head, skin, and other parts of the fish. There is some controversy as to whether thiaminase is present in the flesh when present elsewhere in the body.

Carp, smelt, and herring are the most important species listed as containing the enzyme, with some 10 or 12 less valuable species; such as, suckers, chubs, burbot, and catfish also containing it. Generally speaking, only a few limited investigations for the determination of the presence of thiaminase have been made of fresh-water species and more especially of the marine species of fish.

Since 1944, thiaminase has been found in a few other strictly marine "animals"; namely, the hard clam, the ocean or black quahog, and the edible mussel. The menhaden has joined the herring as the only true fish in salt water known to contain it.

The occurrence of thiaminase in starfish adds an entirely new phylum of aquatic animals to the list of those which contain the enzyme. That it has not been reported in other echinodermata, or in unrelated types of marine invertebrates, is readily explained by the fact that no assays have been, or seem likely to be, carried out. This type of investigation would serve no practical purpose but might throw light on the present very confusing distribution of thiaminase in nature and on its function in metabolism.

Sautier (1946) included 3 species of starfish from Alaskan waters in his list of fishery products assayed for thiamine by the thiochrome method. These species, Pisaster giganteus, Pisaster ochraceus, and Phycnopodia helianthoides, were reported to contain thiamine within the range of 6 to 17 micrograms per 100 grams (5 assays).

The only other reference to the presence of thiamine in starfish, is that of Hutchinson, et al, (1946) who reported 1 milligram per kilogram of starfish meal. They state that, "The low thiamine content of the dried starfish is almost certainly due to post-mortem loss."

Myers (1946), of this laboratory, has found that the thiochrome assay as generally used is of doubtful applicability to the assay of thiamine in fishery products. It is possible that some starfish may contain thiamine and others thiaminase, as similar apparent contradictions have been reported in regard to some species of fish. There are insufficient data to determine the true status of thiaminase, and to correlate its occurrence to such variables as sex, season, maturity, locality, and species. It is suggested that in any fishery product for which a thiamine assay by chemical methods indicates a value of less than 25 micrograms per 100 grams, that the material be tested for the presence of thiaminase by the recovery of added thiamine after incubation under the conditions promulgated for the assay of the enzyme (Sealock, et al, 1943).

THIAMINASE IN STARFISH

The presence of thiaminase in starfish was first detected in the course of a bio-assay intended to determine the thiamine content of raw starfish (Lee, 1948-B). Rats had been maintained on a thiamine test diet (U. S. Pharmacopoeia XI) for a depletion period of 28 days. After this period, rats were assigned to test groups if their weight was less than 100 grams for females, 105 grams for males even though they were still gaining in weight. This unorthodox procedure was necessary in order to assemble a test group within a reasonable time, as the available strain of the rats were quite resistant to thiamine depletion.

Groups of six rats were used on each test level, the animals being evenly distributed as to sex, with no more than one rat from any litter in a group. Rats were housed in individual cages in a room with temperature maintained at 80° ± 2° F. The assay period was four weeks, with liveweight and food consumption records taken weekly.

The first series was composed of ten groups. All rats received the basal thiamine test diet. Three groups received as supplement ½, 1, and 1½ grams of raw starfish per day, 3 groups were given 20, 50, and 80 micrograms of thiamine per 100 grams of diet, and 3 groups received ½, 1, and 1½ grams of raw oysters as a supplement.

The control rats all continued to gain weight during the test period, averaging 8.1 grams per week. The groups receiving thiamine made much larger gains. Groups receiving 20, 50, and 80 micrograms gained 14.1, 20.8, and 24.0 grams per rat per week, respectively. All rats fed oysters also gained more than the controls.

The rats fed raw starfish, however, did very poorly. Of those receiving ½ gram per day, 1 rat gained in weight, 4 rats lost 8 to 27 grams from their starting weight, although they lived for the 4-week period. One rat was killed on the 23rd day after a loss in weight of 27 grams. When one gram of starfish was fed per day, one rat again gained weight, one lost 39 grams before death on the 20th day of test, and 4 others lost 11 to 29 grams during the 4 weeks. One of these latter rats developed severe polyneuritis, but the symptoms were alleviated and there was a slow gain in weight for 2 weeks after it was given 10 micrograms of thiamine in a single dose. When 1½ grams of starfish was fed daily, the final liveweights were 20 to 34 grams below the starting weights and 4 of the 6 rats developed symptoms of acute polyneuritis. The growth curves for these groups are shown in Figure 1.

In view of the evidence that these rats were suffering from an acute thiamine deficiency, 12 of the rats which had been losing weight were selected from the groups fed starfish and were divided into 2 sub-groups. These were fed the basal diet plus 150 micrograms of thiamine per 100 grams of diet with 1 group getting, in addition, 1 gram per day of raw starfish. In 2 weeks, the former sub-group made an average gain of 66.6 grams, while those getting both thiamine and starfish gained 58 grams.

In the meantime, to determine the possible presence of directly toxic agents in the starfish, 2 groups of 11 rats each were fed the regular stock diet, with 1 group getting a daily supplement of 1 gram of raw starfish per rat per day. Over a 3-week period, the controls averaged 23.7 grams per week, and the starfish group, 22.4 grams per week, an insignificant difference.

Considerable difficulty was experienced in getting the rats to eat the starfish supplements, the material apparently was quite unpalatable. This was particularly true of those rats with unlimited access to the stock diet. A number of the animals receiving depletion diets also refused to eat part or all of the starfish offered. This was notably so for those few rats in these groups which gained weight during the test period.

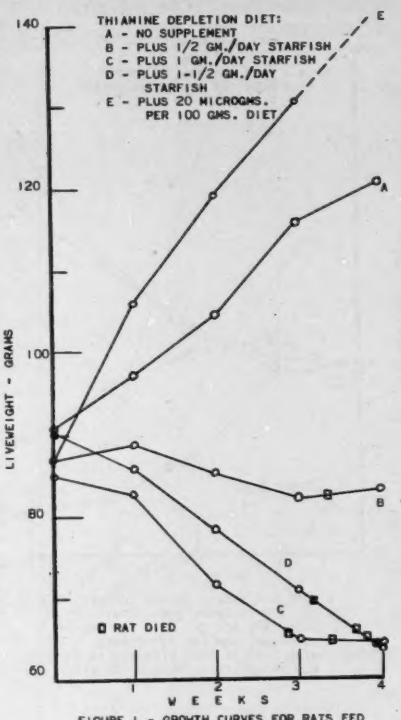

FIGURE 1 - GROWTH CURVES FOR RATS FED THIAMINE BASAL TEST DIET ALONE, AND WITH SEPARATE DAILY SUPPLEMENTS OF RAW GROUND STARFISH AS INDICATED.

On the basis of these tests, it was evident that there was present in starfish a substance capable of destroying a limited amount of thiamine. These studies had been started in November 1941, at which time "anti-thiamine," as it was then called, had been reported but very little was known regarding its chemical structure or mode of action. Chemical assay methods had not been developed, so that it was necessary to use the biological assay method for thiamine. By the use of two series of test groups supplemented with thiamine, one with and the other without an additional supplement of raw starfish, it should have been possible to determine the thiamine destroyed per gram of starfish.

This method did not succeed because of the refusal of most of the rats to eat the starfish supplement with sufficient regularity to permit any degree of quantitative comparison. The basal depletion diet was fed alone and with 10, 30, and 60 micrograms of thiamine per 100 grams, with 4 other groups being fed the same diets plus 1 gram per day of raw starfish. During the shortened test period, each of the groups fed starfish gained less weight than the corresponding groups without starfish but the data showed no significant correlations.

A third series of rats was used to determine the practicability of mixing the ground starfish directly into the basal diet, also to ascertain the reported heat lability of thiaminase. Four groups of 6 rats each were used; these were fed the basal thiamine test diet alone; with 10 percent raw starfish; with 10 percent of starfish which had previously been autoclaved for 15 minutes at 15 pounds pressure; and with an amount of starfish oil equal to that which would be introduced by the inclusion of 10 percent starfish in the diet.

Of course, with finely ground starfish mixed into the diet, the only alternative to eating the mixture was fasting. The amount eaten varied depending upon the condition of the rats. It is probable that the starfish produced a depressing effect upon the appetite, in addition to and before the onset of the anorexia resulting from the thiamine deficiency due to the action of the thiaminase.

The control rats in this group gained an average of 5.8 grams per rat per week during the test period; whereas, those fed raw starfish lost 2 to 34 grams, the

average loss being 6.7 grams per week. One rat died after 2 weeks on test while another developed polyneuritis in 3 weeks. The group fed the diet containing cooked starfish had an average loss in weight of 1.5 grams per week, two rats making small gains while the other four lost from 3 to 19 grams. When fed the diet containing starfish oil, 5 of 6 rats gained weight, averaging 7.1 grams per week. The growth curves for these groups are shown in Figure 2.

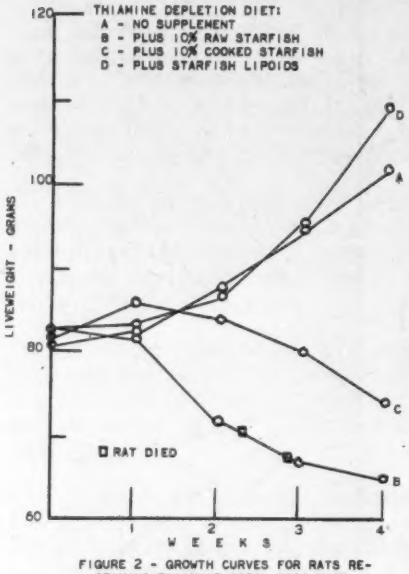

FIGURE 2 - GROWTH CURVES FOR RATS RECEIVING THIAMINE BASAL TEST DIET ALONE AND ADMIXED WITH 10 PERCENT STARFISH, RAW AND AUTOCLAVED, ALSO WITH LIPOIDS FROM STARFISH IN AMOUNT EQUIVALENT TO 10 PERCENT OF STARFISH.

On the basis of this test, it was concluded that starfish oil was in no part responsible for the poor growth which resulted when raw starfish was fed. The destructive principle was not as rapidly and completely destroyed by autoclaving as had been expected, on the basis of reports of heat lability of thiaminase in other materials. This greater heat stability was later confirmed when considerable amounts of thiaminase were found in ground dried starfish meal (Lee, 1948-B).

Relatively heat stable forms of thiaminase have more recently been reported in Indian oil seeds (Bhagvat and Devi, 1944) and in a fern, Pteris aquilina (Weswig, et al, 1946). It now seems probable that "thiaminase" is not a single enzyme, but rather that there are a number of thiamine-destructive principles differing in heat stability, properties on dialysis, and presumably in chemical structure.

Another attempt at a quantitative determination of the thiaminase in starfish was made with a fourth series of rats fed on the thiamine test diet plus 10 percent ground raw starfish, and a group of thiamine supplements. From 10 to 100 micrograms of thiamine per 100 grams were fed in the diet containing starfish, with a control group being fed the basal diet plus 25 micrograms of thiamine per 100 grams. A new lot of starfish had been obtained for this test to lessen the chance of loss of thiaminase which may have occurred in handling or storage of the first lot. The test indicated, however, that the new starfish sample contained less thiaminase than the previous sample. The group fed the basal diet plus 10 percent starfish of the fourth series showed a loss of weight of 2.4 grams per rat per week, only 36 percent of the weight loss of the group in the preceding series fed an identical diet except for the lot of starfish.

The growth curves of this test series are shown in Figure 3. About the best estimate of the amount of thiamine destroyed is 4 micrograms per gram of starfish. The fact that the thiaminase content was lower than was expected led to a selection of supplement levels with too great a spread for accurate evaluation in this low range. The test was not repeated, however, as the procedure was not satisfactory when raw starfish was fed, and results did not justify use of further time and additional rats for this purpose.

THIAMINASE IN STARFISH MEAL

It has already been noted that thiaminase remaining in starfish meal was a factor adversely affecting the growth of chicks fed a mash formula used to determine the value of the meal as a protein supplement. These chicks had been fed on high levels of starfish meal; namely, 32 percent regular meal and 29.5 percent extracted meal. These levels were fed primarily to determine the tolerance of the chick for excess calcium, and an unbalanced calcium:phosphorus ratio. Thiamine in the mash was supplied by bran, middlings, and other grain products, and was adequate in the diets containing pilchard meal and the lower levels of starfish meal.

There were no deaths in these groups until the 13th day of test, but 11 of 21 chicks died during the next 8 days. It was thought possible that this heavy mortality after 2 weeks might be due to a thiamine deficiency resulting from the presence of thiaminase which had not been destroyed by the low drying temperatures. After 3 weeks, therefore, 100 micrograms of thiamine per 100 grams of mash was added to both diets containing the high levels of starfish. The surviving chicks showed much improvement in condition and fairly good growth response during 5 weeks they were fed on the diets supplemented with thiamine as shown in Figure 4.

The slightly better growth of the group fed the extracted meal was probably due to the extraction or destruction of some thiaminase during the prolonged extraction with hot acetone. The thiamine supplement was therefore doubled for the group fed the regular meal after 2 weeks on the 100-microgram level, and a further response in growth was obtained (see Figure 4).

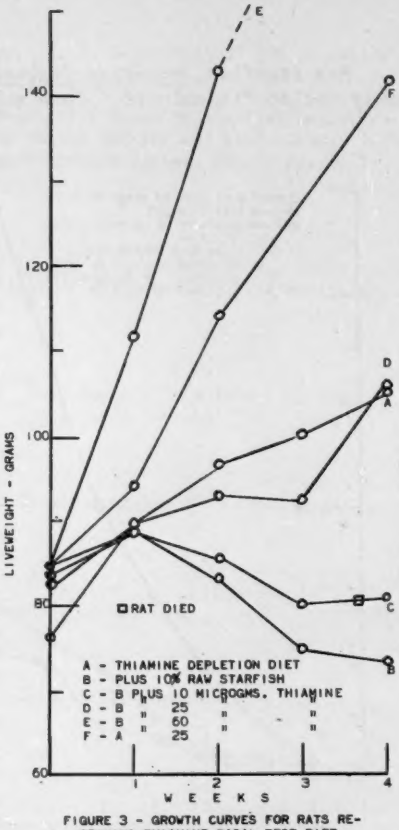

FIGURE 3 - GROWTH CURVES FOR RATS RECEIVING THIAMINE BASAL TEST DIET ALONE AND ADMIXED WITH 10 PERCENT STARFISH, BOTH WITH AND WITHOUT SUPPLEMENTS OF 10, 25, AND 60 MICROGRAMS THIAMINE PER 100 GRAMS DIET. ALSO THE GROWTH CURVE OF THE GROUP FED THE BASAL TEST DIET WITHOUT STARFISH BUT PLUS 25 MICROGRAMS OF THIAMINE PER 100 GRAMS.

Growth, even when the diet was supplemented with 200 micrograms of thiamine per 100 grams of mash, did not approach normal for the age of the chicks. There is no proof that even this relatively large amount of thiamine supplied an optimum level. Feeding tests of the same type conducted by other investigators have shown that the addition, for example, of 200 micrograms of thiamine to a mixture containing thiaminase may result in the loss of 90 percent, which is equal to 180 micrograms of thiamine. If much larger amounts, perhaps 1,000 micrograms, were added, larger actual quantities, but a smaller proportion of the total, for example, 700 micrograms, may be destroyed by the same amount of thiaminase.

On the other hand, the excess calcium carbonate, amounting to almost 18 percent of the diet, was undoubtedly also a factor tending to retard growth but the

separate evaluation of the two effects is impossible from the present data. It is evident, however, that the mortality was primarily the result of a thiamine deficiency due to the thiaminase content of the starfish meal rather than to excess calcium.

CONCLUSIONS

Raw starfish, Asterias forbesi, contains a thiamine-destructive enzyme, commonly called "thiaminase." This was demonstrated by the development of polyneuritis in rats fed one or more grams of raw starfish per day. Recovery and normal growth resulted from the addition of an adequate level of thiamine to the diet.

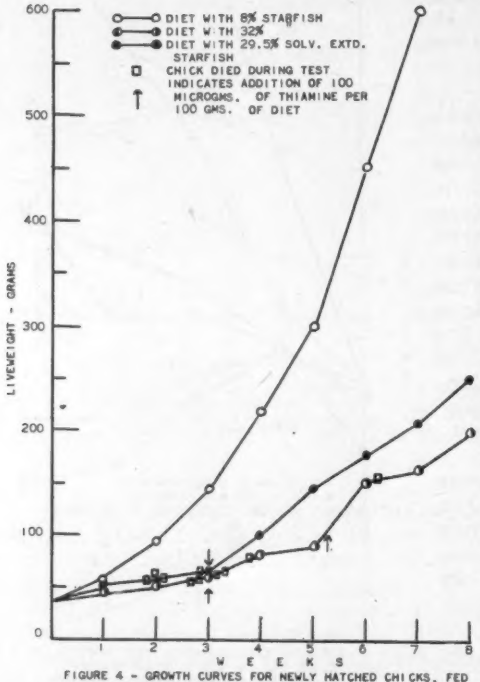

FIGURE 4 - GROWTH CURVES FOR NEWLY HATCHED CHICKS, FED EQUI-PROTEIN MASHES CONTAINING 8 PERCENT STARFISH MEAL, SHOWING NORMAL GROWTH. ALSO CURVES FOR CHICKS FED 32 PERCENT STARFISH MEAL DRIED AT A LOW TEMPERATURE, AND 29.5 PERCENT OF SAME MEAL WITH LIPOIDS EXTRACTED BY ACETONE. THE LATTER TWO DIETS WERE SUPPLEMENTED BY 100 MICROGRAMS THIAMINE PER 100 GRAMS OF DIET AFTER 3 WEEKS, AND THE 32 PERCENT STARFISH MEAL MASH HAD THE SUPPLEMENT OF THIAMINE INCREASED TO 200 MICROGRAMS OF THIAMINE AFTER 37 DAYS, AS INDICATED BY ARROWS.

It was difficult to obtain a quantitative estimate of the amount of thiamine destroyed because of the refusal of rats to eat the raw starfish with any regularity. The best estimate is that one gram of starfish inactivates four micrograms of thiamine. There are indications that other samples of starfish may contain greater amounts of thiaminase.

The thiaminase in starfish is sufficiently stable to remain in starfish meal that has been sun-dried or dried at low temperatures. There are no data to show the amount of thiaminase lost under different conditions of drying.

Thiaminase in starfish meal is primarily responsible for mortality of chicks fed diets containing high levels of this product. This factor and the high calcium content of the starfish meal are responsible for the poor growth obtained. Evidence from other sources indicates that thiaminase would be destroyed at the temperatures commonly used in the dryers in the commercial production of protein meals from fishery products. Any small amount of thiaminase remaining would not give much response since usually less than 10 percent of mixed animal protein supplements are included in commercial mash formulas.

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CHEMICAL COMPOSITION OF SOME CANNED FISHERY PRODUCTS

The dry matter content of the different types of fish varied considerably, from the minced razor clams which contained only 13.9 percent, to the oil packed bluefin tuna which was almost half dry matter or 47.2 percent. Generally speaking, the fatty fish--salmon, herring, mackerel, sardines, and menhaden--are high in dry matter and in energy value. This is true because the protein content of all species is fairly constant, at 17 to 20 percent, higher only when fish have had a precook and partial dehydration. The fat content, which may range up to 20 percent, is in addition to rather than a replacement of any part of the protein.

--Fishery Leaflet 295

MARCH 1948

Beaufort, N. C.

Molds and plastic models for educational work have been completed of the jumping mullet, Mugil cephalus, the most important food fish of the South; the sea mullet, or king whiting, Menticirrhus americanus; the common pompano, Trachinotus carolinus, one of the choicest of food fishes; the porgy or spade fish, Chaetodipterus faber; and the Moorish idol, Zandus canescens, a very colorful Hawaiian fish often used by artists as an inspiration for designs, and a valuable experimental type for developing flexible molds for molding hot plastic materials. A lightweight compound was developed for filling the large bodies of certain species and reducing the total weight of the casts. Construction of a large oven utilizing radiant heat was completed for solidifying and drying plastic models of fish having a length of 3 or 4 feet.

* * *

Practical tests of a continuous oyster-opening machine were made at two large shucking plants. Although the Virginia oysters were comparatively large for this experimental and portable machine they were quickly cleaned and shocked in rotating and tumbling through the seven cylinders, and immediately began to open their shells when transferred to the tank of chlorinated water. The regular shuckers easily removed the meats from the clean, smooth, and open oysters. There was no loss of weight and a better condition of the oyster tissues as compared with the regular hammer and stabbing method of shucking.

Boston, Mass.

The Deep Sea, a trawler equipped to freeze and package king crab, departed from Seattle for fishing operations in Alaskan waters with a Fishery Engineer from the Boston Laboratory aboard as an observer and consultant in the operation of East Coast trawling gear.

* * *

At one of the periodic informal meetings of local industry and Service food technologists, it was indicated that more fundamental research would be desirable on those bacteria primarily involved in fish spoilage.

* * *

The Quartermaster Food and Container Institute, Chicago, Ill., and a meat packer are planning experiments on the smoking of meat products in the electrostatic fish smoking device at Eastport, Me., through arrangements with the Maine Sardine Packers Association.

College Park, Md.

A gram-positive spore forming rod, tentatively identified as belonging to the B. subtilis group has been isolated from crab meat. This organism is active against a wide variety of gram-negative and gram-positive organisms and also is active against yeasts and molds. It and antibiotic spectrum are being checked for similarity to other organisms of the same group which are already known to produce antibiotic substances.

* * *

Micro-films of German literature on fishery matters obtained by American Technical Teams were being scanned. Those thus far examined contain no information of value.

* * *

Canned packs of chum salmon and pork, chum salmon and veal, shrimp, river herring, and rosefish were prepared for the sandwich spread project. Spiced shrimp and whiting were packed to obtain information on canning methods.

* * *

Several formulas for shrimp specialty products were perfected.

* * *

Palatability tests were conducted using four flounder recipes, nine frozen pollock recipes, three crab meat recipes, five halibut recipes, and one recipe each for smelt, shrimp, and salmon. Also four lots of fish spread were tested.

* * *

Assistance was rendered in the development and testing of large quantity fish recipes and in the preparation of the publication entitled "School Lunch Recipes Using Fish," which will be used in the 111 schools during the Department of Agriculture's fish study project.

* * *

The trailer laboratory was taken to Chincoteague for studies in connection with the clam-duck survey.

Ketchikan, Alaska

Tests made on extracts from clam samples dug in January indicate that toxicity of clams dug moderate distances apart can vary considerably. The data obtained this winter confirms the results of the previous year, which indicated that the toxin is not rapidly dissipated during the fall and winter months.

* * *

Several variations of a smoked salmon spread were prepared and tested, and a satisfactory formula for a processed spread was determined.

* * *

A large quantity of Alaska nuggets, a semi-cooked salmon product, was prepared, packaged, and frozen for later storage tests.

* * *

Preliminary laboratory tests demonstrated that propylene oxide was very effective as a mold retardant for smoked fish. However, the odor and flavor left by this chemical may prove objectionable.

Seattle, Wash.

The annual Open House was held March 11 and 12 with 404 registered visitors. The technological theme was utilization of fish waste with particular emphasis on Alaskan salmon cannery waste. For the first time, the Open House included Fishery Biology exhibits. The Washington State Fisheries Department also participated with a demonstration of a controlled smokehouse.

* * *

An experimental pack of salmon put up last summer with added oil prepared from the segregated parts of cannery trimmings by the conventional steaming method and by alkali digestion showed no significant difference in palatability regardless of the method of rendering the oil.

* * *

Large scale filleting of frozen and thawed flounder by professional fillet cutters at a commercial plant showed no difficulty in handling the thawed fish.

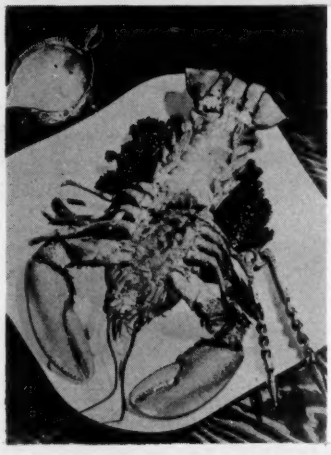
* * *

"Employment Possibilities in the Alaskan Fishing Industry" was completed for publication as a Fishery Leaflet.

* * *

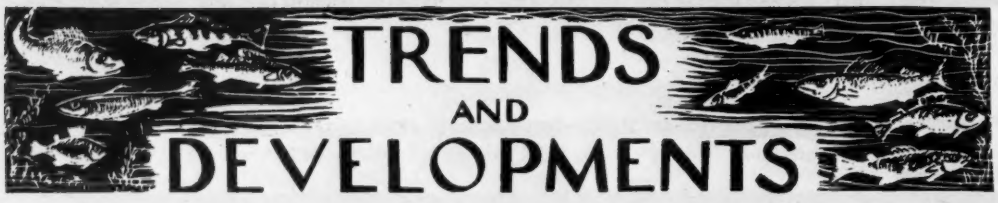
The Pacific Explorer, an 8,500-ton factory ship, left Seattle for the Bering Sea on March 26 with a Seattle and a Ketchikan technologist aboard as Service observers.

BROILED LOBSTER



Select small (chicken) lobsters.

Place the American lobster on its back on a cutting board and kill by inserting the point of a knife between the body shell and tail segment, cutting downward. Then split from head to tail and remove fat, coral (if present), stomach, and the vein that passes through the center of the tail segment. Rinse, brush the flesh with melted butter, season with salt and pepper if desired, and spread out flat on the broiler, flesh side up. Regulate the heat at about 350° F. Cook slowly for 10 minutes, turn, and cook 10 minutes longer. Remove to a hot platter and dress with melted butter to which a little lemon juice has been added. The spiny lobster tail is usually cut lengthwise on the underside, flattened, and then broiled.



Additions to the Fleet of U. S. Fishing Vessels

During March, as in the first two months of the year, the documentation of fishing vessels was less than for the same period in 1947. Seventy-nine vessels of 5 net tons and over received their first documents as fishing craft during March 1948, compared with 87 vessels in the same month the previous year. A total of 171 fishing vessels were documented during the first three months of 1948, compared with 222 vessels in the first quarter of 1947. Texas led with 16 of the vessels documented during March, followed by California with 15, and Washington with 14, according to information received from the Bureau of Customs, Treasury Department.

Vessels Obtaining Their First Documents as Fishing Craft

Section	March		Three mos. ending with Mar.		Total
	1948	1947 1/	1948	1947	1947
	Number	Number	Number	Number	Number
New England	-	5	3	10	75
Middle Atlantic	3	5	5	12	70
Chesapeake Bay	3	7	8	15	97
South Atlantic and Gulf	30	33	76	95	490
Pacific Coast	32	18	57	57	411
Great Lakes	1	3	3	8	74
Alaska	9	15	16	20	47
Hawaii	1	1	3	5	23
Unknown	-	-	-	-	12
Total	79	87	171	222	1,299

1/Revised.
Note: Vessels documented by the Bureau of the Customs are craft of 5 net tons and over.

Coast Guard Auxiliary To Check Motorboats

United States Coast Guard Auxiliary will assist the regular Coast Guard by promoting safe motorboat operation through the Auxiliary's Nation-wide Courtesy Inspection Program this summer, according to the Coast Guard Bulletin for April 1948. The purpose of the courtesy inspections is to provide owners with a check on the safety of their craft. The greater part of the 48 States is covered by Coast Guard Auxiliary Service. All the coastal States, Atlantic, Gulf, and Pacific, the Great Lakes States, and the States in the Mississippi River Valley and along its tributaries have Coast Guard Auxiliary units.

Courtesy Inspection Procedure: Inspection officers follow this standard pattern of inspection procedure:

1. Courtesy inspections are made only when the motorboat is alongside of the dock or on the owner's mooring, and only by the owner's request.

2. Only a duly appointed inspection officer goes aboard the boat to be inspected.

3. Inspectors wear regulation Coast Guard Auxiliary uniform.

4. In the first part of the inspection, the equipment required by the Motorboat Act, including suitable running lights, life preservers or ring buoys, fire extinguishers, whistle or horn, bell, flame arrestor on carburetors of gasoline engines, and ventilators with cowls for bilges and fuel tanks of gasoline-powered boats are checked. If in the opinion of the inspecting officer the boat passes this part of the inspection, an inspection sticker is issued, mailed to the owner by the division captain. The check sheet is left with the owner regardless of whether the boat does or does not pass.

5. In the second part of the inspection, the items not required by law, but considered important by the Coast Guard for safe operation are checked. These items are anchors, barometer, bilge pump, carburetor drip pan, compass, distress signals, emergency rations and water, local Coast and Geodetic Survey charts, first-aid kit and manual, ring buoys, lead line for sounding, mooring lines, and tools and spare parts.

Food and Agriculture Organization

COUNCIL IN SESSION: Important policy decisions affecting the work of the Food and Agriculture Organization of the United Nations were taken by the Council of FAO in a 2-week session in Washington, concluded April 17.

A special session of the full Conference of FAO, by acclamation, chose Norris E. Dodd, Under Secretary of Agriculture of the United States of America, to succeed Sir John Boyd Orr as Director-General.

It is expected that the new Director-General will take office within a few weeks. His appointment runs through the close of the 1950 Session of the FAO Conference, and is renewable at that time for any period agreed upon mutually.

The new Director-General has been Under Secretary of Agriculture in the Government of the United States since April 1946. He has been associated with the administration of national farm programs since 1933.

In addition to broad experience in practical farming and in the official agricultural programs of his own country, Mr. Dodd has been closely associated with agricultural developments in the international field.

It admitted Turkey and Ceylon to FAO, bringing the total membership of the Organization to 57 nations.

The Council approved the reports of the Baguio Conferences on fisheries and nutrition. The Fisheries report included a recommendation that governments of the Southeast Asia area establish an Indo-Pacific Fisheries Council to work toward greater utilization of the resources of the seas.

One of the final acts of the Council was to designate Washington as the place for holding the fourth annual session of the FAO Conference. The Conference is scheduled to open November 15. The next session of the Council will be held November 1 to 15.

* * * * *

ADDITIONS TO STAFF: Mogens Jul, Danish fisheries technologist, has joined the staff of the Food and Agriculture Organization of the United Nations as head of the Technological Branch of the Fisheries Division. Since 1942, Mr. Jul has been head of the Research Laboratory of the Danish Department of Fisheries. He was, at the same time, professor of the Technical University of Denmark and co-director of the Institution's Food Preservation Laboratory. Since 1947, Mr. Jul has also been head of the Chemical Biological Division of the Danish Institute of Refrigeration.

One of Mr. Jul's first tasks in FAO will be to collect information in preparation for international discussions on the possibilities of establishing agreed standards for certain fisheries products entering into international trade.

All three branches of Fisheries Division of FAO are now in operation. The Economics Branch, directed by G. M. Gerhardsen, will shortly publish the first FAO Fisheries Yearbook. Mr. Gerhardsen is at present preparing a report on the salt fish trade. He is on leave from his post as head of the Fisheries Economics and Statistics Branch of the Norwegian Fisheries Administration.

J. L. Kask joined FAO staff in February 1948 as head of the Biological Branch and attended the Fisheries Conference at Baguio, P. I., with D. B. Finn, Director of the Fisheries Division, and G. L. Kesteven, FAO regional fisheries representative in the Far East.

Mr. Kesteven is, at present, engaged in coordinating the work of the four working committees--hydrology, taxonomy, biology, and technology--appointed at the Baguio Conference. These committees will be engaged in preparatory work of collecting information and coordinating research pending the ratification of the agreement to establish the Indo-Pacific Fisheries Council.

Imports of Groundfish, Including Rosefish, Fillets

Imports of cod, haddock, hake, pollock, cusk, and rosefish fillets, etc., during April 1948 amounted to 4,762,171 pounds--145 percent more than the quantity received in April 1947. Total imports during the first four months of 1948 amounted to 16,569,666 pounds--a 127 percent increase over the corresponding period in 1947.

In accordance with new provisions of the tariff regulations concerning these imports, the Bureau of Customs increased the duty from 1-7/8 cents per pound to 2-1/2 cents per pound, effective May 10. Heavy imports in recent weeks made it apparent that the 6-months' quota of 12,466,000 pounds would be filled on or shortly after that date. Since the quota is now on a quarterly basis, imports received after July 1 will again enter at the reduced tariff of 1-7/8 cents per pound until the quota of 18,699,000 pounds for the first nine months of the year is exhausted.

International (Halibut) Fisheries Commission

The Canadian Government announced the resignation of A. J. Whitmore from the International (Halibut) Fisheries Commission and the appointment of Dr. Stewart Bates, Canadian Deputy Minister of Fisheries, to fill the position.

International Pacific Salmon Fisheries Commission

Announcement was made on April 8, 1948, by the Canadian Department of Fisheries that Olof Hanson, of Vancouver, B. C., has been named by the Government to succeed the late A. L. Hager, of Vancouver, as a member of the International Pacific Salmon Fisheries Commission.

The Commission was created by Canada and the United States about 10 years ago for the protection, preservation, and extension of the sockeye salmon fisheries of the Fraser River system. It has been responsible for such large scale undertakings as the construction of the fishways cut through the rocks at Hell's Gate Canyon on the Fraser to cure an obstructive condition which, over the years, had greatly diminished the sockeye run. Canadians already serving on the Commission are Thomas Reid, M. P., and A. J. Whitmore, Vancouver, who is also the Federal Chief Supervisor of Fisheries for British Columbia.

The new Canadian Commissioner has long been associated with the fishing industry in British Columbia although interested also in other important industrial undertakings. He has been president of several successful fishing companies and is thoroughly acquainted with the various branches of the salmon industry. For several terms, he served in the House of Commons but retired from political life in 1945.

Wholesale and Retail Prices

The wholesale price index for food continued to decline in March. Compared with the previous month, the decrease was 1.2 percent, but it was still 2.8 percent higher than the food index for the corresponding period a year ago, according to the regular monthly survey by the Bureau of Labor Statistics of the U. S. Department of Labor.

Average wholesale prices for canned salmon remained steady at the same levels as for February, but were still considerably higher than a year ago.

From mid-February to mid-March, retail food prices dropped for the second consecutive month to bring the food index for large cities combined to 202.3 percent of the 1935-39 average. This decline was slightly more than is usual for this season when food prices decrease by about 1 percent. Although food prices compared to the previous month dropped 1.2 percent, they were still 6.8 percent higher than the corresponding period a year ago.

The retail fresh, frozen, and canned fish index for March showed a slight decline of 0.4 percent compared to the previous month, but an increase of 17.9 percent

compared to a year ago. The fresh and frozen fish retail index dropped 0.7 percent compared with the previous month, but was still 10.6 percent higher than a year ago. Retail prices for canned pink salmon showed a slight increase but the rate of increase was too small to be significant.

Wholesale and Retail Prices

Item	Unit		Percentage change from--	
Wholesale: (1926 = 100)		Mar.13,1948	Feb.14,1948	Mar.15,1947
All commodities	Index No.	159.8	+0.1	+7.8
Foods	do	171.2	-1.2	+2.8
Fish:		Mar.1948	Feb.1948	Mar.1947
Canned salmon, Seattle:				
Pink, No. 1, Tall	$ per doz. cans	5.171	0	+68.7
Red, No. 1, Tall	do	6.402	0	+19.4
Cod, cured, large shore, Gloucester, Mass.	$ per 100 lbs.	14.500	0	- 3.4
Retail: (1935-39 = 100)		Mar.15,1948	Feb.15,1948	Mar.15,1947
All foods	Index No.	202.3	-1.2	+6.8
Fish:				
Fresh, frozen, and canned	do	313.6	-0.4	+17.9
Fresh and frozen	do	274.4	-0.7	+10.6
Canned salmon:				
Pink	¢ per lb. can	51.7	+0.2	+26.7

Purchases of Fish by Department of Agriculture

The United States Department of Agriculture reported the purchase of 72,500 cases of canned squid during April 1948 for U. S. foreign relief to Greece, compared with 6,465 pounds of frozen fillets and 1,385 cases of canned fish purchased during March 1948. No purchases were made in April 1947.

Purchases of Fishery Products by USDA

Commodity	Unit	April 1948		Jan. thru Apr. 1948	
		Quantity	Cost	Quantity	Cost
FISH			Dollars		Dollars
Fillets, cod, frozen	Lbs.	-	-	4,080	1,428
" , whiting, "	"	-	-	2,385	598
Total	"	-	-	6,465	2,026
Herring, canned[1]	Actual Cases	-	-	47,145	144,264
Pollock, flaked, canned[2]	" "	-	-	1,385	7,735
Whiting, canned[1]	" "	-	-	351	1,074
Squid, canned[2]	" "	72,500	362,625*	72,500	362,625
Total	" "	72,500	362,625	121,381	515,698
Grand Total		72,500	362,625	-	517,724

1/Actual cases contain 24 - 15 oz. cans. *F.o.b. origin.
2/Actual cases contain 48 - 15 oz. cans.

FOREIGN

British Honduras

SPINY LOBSTER FISHING: The first attempt at exploitation of the British Honduras spiny lobster (rock lobster) on a commercial scale occurred in 1931 when a cannery was operated for a short period at Cay Caulker, according to the American Consulate at Belize, British Honduras. The experiment failed owing to the disinclination of the fishermen to catch the lobsters in sufficient quantities (4,000 pounds per day) to make operation of the cannery profitable.

SPINY LOBSTER (PANULIRUS ARGUS)

In 1946, an American firm established a profitable spiny lobster business. A number of collection points were set up at various cays, chiefly Cay Caulker and Ambergris Cay. These are visited regularly by a fishing vessel equipped with refrigerating apparatus. The collection points are kept supplied by local fishermen who employ lobster pots and nets. The catch averages 5,000 pounds per week. Prevailing prices have been 6½ cents per pound for spiny lobsters. The spiny lobsters are then quick-frozen and subsequently flown to New Orleans, La. This business has been somewhat affected recently by the arrival of a group of American fliers operating out of Tampa, Fla.

Another enterprise is that of a motor vessel of United States registry which operates out of Miami, Fla. This vessel, which has refrigeration equipment capable of keeping indefinitely a cargo of 55,000 pounds of spiny lobster tails, makes regular trips to British Honduras during the open season, which extends from October through March.

The vessel proceeds first to Point Placentia, Honduras, where it takes aboard, usually from 15 to 20 men with their dories for an extended period. The men get free food and cigarettes, good pay, and cash advances for their families. The vessel then makes a 2-week tour of the spiny lobster grounds off Glover's Reef and Cay Glory, moving each night to a new position.

Each morning, when the weather permits, the fishermen set out from the parent vessel, one man to each dory. Their fishing equipment consists of a glass-bottom box, which enables them to spot their prey in the shallow water around the reefs, and a pole equipped with a large hook from which the barb has been removed. The lobster is simply gaffed with the hook and hauled into the dory. In this manner, a good fisherman may obtain as many as 200 or 300 spiny lobsters in a day. He is paid 7 cents per lobster for the smaller ones taken at Cay Glory, and 9 cents

per lobster for the larger ones taken off Glover's Reef. (The lobsters migrate from north to south, facing into the current, which brings them their food. Consequently, those taken in the southern waters generally run larger.)

As each dory returns, the fisherman tosses his still live catch onto the deck of the larger vessel, where a member of the crew counts them and rejects any which do not meet the legal minimum size requirement of 4 inches from the base of the horns to the end of the jacket. Next, members of the crew, wearing canvas gloves to protect their hands from cuts and the resultant "lobster-poisoning," twist off the tails, which contain almost all the edible portion of the spiny lobster, and toss them into a basket, heaving the remainder of the lobster into the sea. After washing, the lobster tails are weighed into 5-pound lots (actually slightly over 5 pounds to allow for loss of weight by freezing) and placed in cardboard containers. The containers are then stacked in the refrigerated hold, where the temperature of -15° F. quickly freezes solid their highly perishable contents.

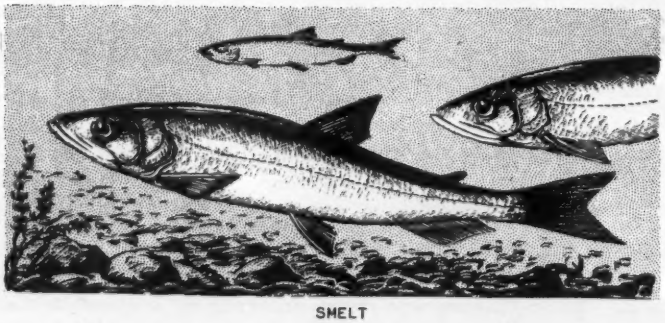
When the captain has obtained a sufficient trip (his maximum thus far has been 45,000 pounds in a month of fishing), he returns to Miami, where his frozen cargo is loaded on trucks and shipped to the mid-West. The average price paid to the fishermen is 11 cents per pound, spiny lobster tails ranging in weight from under ½ pound to over 2 pounds.

The following table shows exports of spiny lobsters for the years 1945-47. Almost all exports are to the United States.

	Quantity Lbs.	Value U.S. $		Quantity Lbs.	Value U.S. $		Quantity Lbs.	Value U.S. $
1945 -	1,536	86	1946 -	92,390	6,742	1947 -	185,317	19,070

It is likely that the industry will continue to expand, as no decline has been perceived in the supply of spiny lobsters.

Canada



SMELT

ATLANTIC FISHERIES: In the Atlantic fisheries, an increase in the production of smoked cod fillets is noticeable, but it is too early to conclude that this is a significant development. In the winter smelt fishery, a larger proportion of the catch has been frozen; 85 percent as compared with 60 percent in 1947.

PACIFIC WINTER HERRING: The British Columbia herring season closed during the last week in February. A total of 171,434 tons were landed. Somewhat less than 30 percent of this was utilized for canning, resulting in a pack of 1,255,562

cases, less than 80 percent of the 1947 pack, according to the Dominion Bureau of Statistics. The bulk of this year's pack was purchased by the Government for European relief. About 60 percent of the catch was utilized for reduction, producing 21,170 tons of meal and 1,889,943 gallons of oil. In addition, 1,428 tons of cured (dry-salted) herring was produced.

EMBARGO ON EXPORTS OF RAW SALMON: The Canadian Minister of Fisheries announced in Parliament, on April 9, 1948, the re-imposition of the embargo on exports of raw sockeye, pink, and chum salmon, according to the American Consulate General at Vancouver. Raw coho salmon may be exported until September 1, 1948, when the embargo on this species will become effective. The move is intended to "provide equitable safeguard for management in maintaining its canning industry and for fishermen by leaving the way open for them to take advantage of the higher prices paid on the United States' market ..."

There are no restrictions on exports of any species of canned, salted, smoked, cured, or frozen salmon, and on raw spring salmon.

MARKETING OF CANADIAN FISH: Efforts are being made to stimulate the sale abroad of Canadian fish through the establishment of the Inter-departmental Fisheries Export Marketing Committee, which will comprise members of the Department of Fisheries and the Department of Trade and Commerce. The Committee will consult with industry concerning special marketing problems as they arise. It was officially launched on April 12.

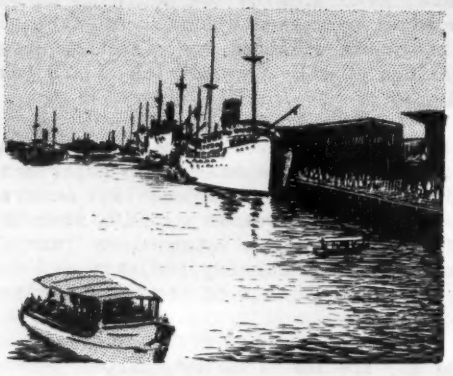
It is appreciated that the market for fish and fishery products is becoming more competitive, and that this situation requires special consideration by officials in Canada, operating in conjunction with trade commissioners in countries that might secure supplies from this Dominion.

Canadian exports of fish and fishery products in 1947 were valued at $82,359,000, compared with $86,486,000 in 1946, and with $26,530,000 in the corresponding period of 1938. The value of Canada's exports for the first three months of 1948 is $23,792,000, compared with $20,400,000 in the corresponding period last year.

Indonesia

TUNA INDUSTRY: The Department of Economic Affairs of the interim Government of Indonesia intends to launch an expedition to investigate the possibilities of establishing a tuna canning industry in East Indonesia where a certain local variety called the "tjakalang" is said to abound in extremely large quantities in the waters between New Guinea and the Straits of Macassar, according to the American Consulate General at Batavia, Java.

An official of the Department's Industrial Section has been assigned to organize the expedition. A vessel has been especially equipped by the Sea Fishery office to ply East Indonesian waters on a 6-months' cruise to gather fish and study various methods of preservation (drying, salting, and canning). Due to lack of sufficient fish in the Javanese diet, protein deficiencies have been noticed which could be greatly relieved if the "tjakalang" were to be exported to Java. The expedition will also undertake to analyze the peculiar formation of poisonous



substances encountered in the salting of the "tjakalang" which has prevented its wider use throughout the archipelago. Furthermore, an initial experimental preserving station will be set up at Aertenbaga, an important East Indonesian fishery center to be followed by a second at Amboina. An attempt will also be made to prepare a fish meal rich in vitamins A and D from fish offal. In addition, biological phenomena will be analyzed during the expedition by the chief of the Marine Research Laboratory.

If these experiments succeed, it is hoped that a new industry may be established in East Indonesia which may prove a material factor in the economy of the new State.

Japan

AGAR-AGAR: During the 1947-48 agar-agar processing season, which ended recently, 1,330,333 pounds of agar-agar were produced in Japan, according to the Natural Resources Section of the Allied Powers in Japan. About 1,000,000 pounds, valued at $1,250,000, will be offered for export. During the 1946-47 season, 1,000,000 pounds of agar-agar were produced and 750,000 pounds contracted for export.

AQUATIC RESEARCH REFORM COMMITTEE: On March 30, 1948, a representative of Natural Resources Section, addressed the first meeting of the Aquatic Research Reform Committee, recently established by the Ministry of Agriculture and Forestry to study Japanese research institutions and make recommendations for the reorganization of Japanese aquatic research.

GLASS FLOATS: The Japanese fishing industry uses glass balls as floats principally for deep-water dip nets, drag nets, set nets, and tuna long lines. The balls are usually from 6 to 45 centimeters (2.4 to 17.7 inches) in diameter and weigh from 25 to 2,800 grams (0.9 to 98.7 ounces).

Glass floats were first used in Japan in 1910, but the practice was not general until about 1926 when the fishermen in northern areas of Japan adopted them. Shortly thereafter, all Japanese fishermen used them.

All glass floats used in Japan have been manufactured domestically. Before World War II, approximately 10 factories specialized in the manufacture of glass balls, but now only four principal manufacturers operate in northeastern Japan. Although monthly production capacity of these factories is about 330,000 glass balls, actual production is less than 50 percent of capacity because of coal shortages. Japanese glass floats are still hand blown because of the difficulty of maintaining a uniform thickness of glass by machine blowing.

WHALING SEASON CLOSES: The 1947-48 Japanese Antarctic whaling operation ceased March 10, 1948. As a result of increased efficiency in production, actual

yield of meat, oil, and blubber per blue whale unit exceeded anticipated production, although the number of whales caught this season fell short of the goal. The total catch for the season beginning December 8, 1947, was 1,321 whales (1,017 blue whale units) against a goal of 1,700 whales (1,300 blue whale units).

Newfoundland

SALTED COD EXPORTS, 1947: In 1947, exports of salted cod amounted to only 95,828,544 pounds, compared with 124,887,392 pounds in 1946. Exports fell off largely because of foreign exchange restrictions, and relatively large stocks were carried over for marketing in 1948. In the fall of 1947, the situation with respect to the export of salt cod became highly uncertain because of sterling restrictions imposed by the United Kingdom. The Newfoundland Government eventually intervened, however, making a portion of its dollar surplus available to exporters. This enabled exporters to resume sales to the sterling areas in late 1947 and early 1948. Exports of 1947 stocks during the early months of 1948 proceeded satisfactorily, according to the Consulate General at St. John's, Newfoundland.

A comparison of figures showing exports of salted cod by countries in 1946 and 1947 reflects the foreign exchange difficulties encountered in 1947. Exports fell off to most countries in the sterling area, but generally increased to markets in the Western Hemisphere. While no comparative figures are available for the calendar year 1946, official figures disclose that Newfoundland's exports of salted cod in the fiscal year April 1, 1946, to March 31, 1947, were valued at **$15,287,000--$1,500,000 more than in the calendar year 1947.**

DRIED COD FISH BEING CULLED AND PREPARED FOR MARKET AT CARBONIAN, NEWFOUNDLAND[1/]

1/Courtesy of Daily News, St. John's, Newfoundland.

Table 1 - Exports of Salted Cod from Newfoundland

Exported To	1947 SALT		1946 SALT	
	Dried	Wet[1]	Dried	Wet[1]
	Lbs.	Lbs.	Lbs.	Lbs.
North America				
United States	147,728	3,009,216	940,464	4,406,080
Canada	458,640	3,756,704	310,800	3,784,816
South America				
Brazil	7,326,704	-	4,845,792	-
West Indies				
Jamaica	12,328,064	-	10,595,200	-
Puerto Rico	17,481,632	-	16,306,080	-
Other	11,317,824	448	11,011,952	-
Europe				
Italy	8,009,008	4,480,000	24,222,800	-
Portugal	15,812,496	-	18,074,448	-
Spain	7,688,800	-	18,577,888	-
Greece	672,000	-	8,388,352	-
Other	3,258,640	80,640	1,068,816	2,353,904
Total	84,501,536	11,327,008	114,342,592	10,544,800

1/Salt bulk

EXPORTS OF OTHER FISHERY PRODUCTS, 1947: In 1947, Newfoundland's exports of fish and fishery products other than salted cod approximated $12,500,000, compared with $16,000,000 in 1946. This drop of more than $3,500,000 may be accounted for by an approximately $3,500,000 drop in the value of cod fillet exports (from about $5,000,000 to about $1,500,000).

FISH FILLETING AT ST. JOHN'S, NEWFOUNDLAND, 1948 1/

1/Courtesy of Daily News, St. John's, Newfoundland.

The frozen fillet industry, after mushrooming during the war from an export figure of 6,500,000 pounds to over 30,000,000 pounds in 1945 and 1946, fell off

Table 2 - Exports of Certain Fishery Products from Newfoundland - 1947

Exported to	Fillets (chilled and frozen)			Herring, pickled	Lobsters, Live
	Bream	Cod	Haddock		
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
United States	993,850	7,896,383	2,977,340	15,048,660	1,980,371
Canada	43,439	1,866,932	69,508	1,195,775	1,264,783
UNRRA	-	-	-	15,648,425	-
Other	-	40,680	2,340	464,875	700
Total	1,037,289	9,803,995	3,049,188	32,357,735	3,245,854

sharply in 1947, exports amounting to about 12,500,000 pounds. Loss of the United Kingdom market and inability to exploit the United States market on a larger scale were the principal reasons for this steep decline.

Norway

FISHERIES REVIEW, 1947: Preliminary estimates indicate that the total catch of the Norwegian fisheries in 1947 was approximately 1,058,700 metric tons with a value of $59,600,000, according to the annual economic review submitted by the American Embassy at Oslo.1/

The catch was as great as in any of the best years prior to the war and was 233,800 metric tons larger than in 1946. The money value of the catch was the highest ever recorded; $19,300,000 above the previous record value of the 1946 catch. The record 1947 catch was brought about mainly by the large yield of the winter herring and cod fisheries.

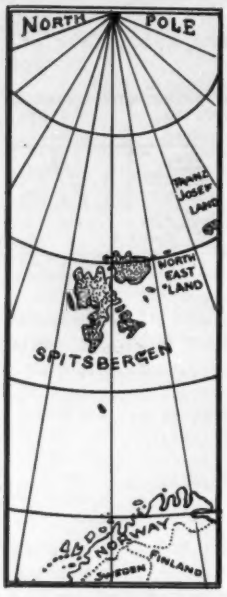
On the whole, Norwegian fishermen enjoyed good economic returns, but normal conditions in the industry have not yet been restored. There is still a large unsatisfied demand for fishing gear, although the supply situation in this regard has improved since 1946.

LOFOTEN ISLES

Cod Fisheries: The yield of the cod fisheries in 1947 was unusually large. Total production of cod in 1947 amounted to 229,002 metric tons (dressed weight) compared with 182,070 metric tons in 1946.

The total value of the cod catch is estimated at $10,800,000. The parts of the catch processed by various methods were as follows, in metric tons: dried, 44,637; salted, 86,314; marketed fresh, 14,880, of which quantity 2,414 tons were used for fillets. In addition, there were produced 7,920 tons of cod liver oil; 1,511 tons of salted cod roe; 1,266 tons of sugar-salted cod roe; 1,543 tons of cod roe for canning; and 63 tons of roe for fish meal.

1/Where available, 10-month figures in the review, particularly for exports, have been revised and now cover the whole of 1947.



Cod fishing on distant fishing grounds in 1947 was considerably more active than the year before. In the line fishing at Bear Island (Bjørnøya) and Spitsbergen (Svalbard) there was considerable participation by Norwegian vessels. Only one Norwegian vessel participated in line fishing in Iceland and only four vessels off western Greenland.

Both line fishing and trawl fishing in the waters around Bjørnøya and Svalbard were rather unsuccessful. It appeared that the cod in 1947, in contrast to earlier years, did not go to these areas, but instead spread out on the banks of the Barent Sea.

From time to time during the year, the marketing facilities for cod were overtaxed on account of the large number of vessels engaged and the great catches landed in certain areas, but on the whole, the marketing machinery was able to take care of the fish brought in. On account of abnormal conditions in the export trade, there was less demand for roe for salting purposes and much roe had to be dumped into the ocean.

It is estimated that economic returns were such that the average weekly share of crew members in vessels using nets was about $54; fishermen engaged in line fishing netted $32; and men hand-lining from small boats obtained about $27.

Herring Fisheries: In 1947, as in 1946, the winter herring season started late. It was a successful "large herring" season. The total catch was 320,000 metric tons. The so-called "spring herring" season was not so successful. As is usually the case in winters of severe cold weather, the herring did not go onto the banks and stay there. The yield of the spring herring fisheries is estimated at 210,000 metric tons. In 1946, the total herring catch was 382,200 metric tons.

Of the total 1947 herring catch, 46.8 percent was taken by means of purse seine; 52 percent was taken with nets.

According to estimates made by the Norwegian Herring Marketing Cooperative, the average prices for herring caught by means of purse seine during the "large herring" period was $1.44 cwt. and in the "spring herring" period it was $1.17 cwt. Prices for herring caught in nets were practically the same.

The total market value of the winter herring fisheries amounted to $13,073,984. In addition, $3,087,043 was paid by the Norwegian State as a subsidy to cover the guaranteed average sale prices of $1.55 and $1.26 cwt. for the two periods of the herring fisheries. Thus, the fishermen altogether received $16,155,005, or $6,519,115 more than the corresponding value in 1946, and $3,782,696 more than the value for 1945. Money receipts were the highest Norwegian herring fishermen have ever received for one season.

The export of herring packed in ice and frozen herring increased considerably as compared with previous years. Exports of salted herring were 30,000 metric tons above the previous year. Plants producing herring oil received a larger percentage of the catch than was common during the war years and the first postwar seasons. A larger proportion of the herring catch was needed to meet the increased demand in Western Europe for food fish.

The catch of so-called "fat herring" and "small herring" in 1947 was poor. Some of the herring tabulated as "fat herring" in reality were simply herring which were caught along the west coast during the period April-June. The real "fat herring" fishing during the summer and fall months was a total failure. The "small herring" fishing also was poor. Very small catches were obtained in northern Norway and investigations made on the fishing banks by means of radio sounding apparatus seemed to indicate a small supply of fish. As of November 29, 1947, the catch of "fat herring" was 21,750 metric tons as against 30,400 metric tons the previous year. The catch of "small herring" during the same period was 42,900 metric tons as against 69,500 metric tons in 1946.

Herring Fisheries in Iceland: During the herring fishing season in Iceland, 201 Norwegian vessels were engaged. Of these, 47 were equipped with purse seines, 151 with nets. Two were freight boats for the transport of salted herring and one vessel was used for the transport of fresh herring.

The value of the 1947 Norwegian catch of herring from the Iceland fishing grounds was estimated at $4,300,000.

Brisling: Neither on the west coast nor in eastern Norway was brisling fishing very successful. The total catch was only 9,500 metric tons as compared with 13,860 tons in 1946.

Trawl Fisheries: In the North Sea, Norwegian trawling increased from 7 trawlers in 1946 to 70 small vessels in 1947. On the whole, the fishing was successful; the total catch was about 4,000 tons.

Other Fisheries: In 1947, there was fairly active participation in the mackerel fisheries. Good catches were obtained during May and June by drifters and purse seiners. Considerable quantities of "Pir" (small mackerel) were used for canning. The total mackerel catch was estimated at 14,000 metric tons, almost twice as much as 1946.

Coal Fish (Sei) Fisheries: Unfavorable weather handicapped the catch of sei. The total catch at the end of November was estimated at approximately 35,000 metric tons.

Exports: Total exports of fish and fish products during the first 10 months of 1947 reached a value of $73,800,000 compared with $55,500,000 in 1946. (These figures include canned fish, but do not include exports of herring meal and fish meal, cod liver oil, and salted cod roe which appear under other classifications in the export statistics.) The 1947 value of such exports reached an all-time high; during the years previous to the war, annual export values fluctuated around $23,100,000 to $28,100,000.

Exports of fresh fish during 1947 were 50,612 metric tons as against 24,758 metric tons in 1946. More than half of the exports of fresh fish consisted of cod and fillets of cod.

Exports of salted fish decreased greatly, from 35,095 tons in 1946 to 10,011 tons in 1947.

Exports of dried fish and "klipp-fisk," which during the war years dwindled to practically nothing, were resumed in substantial quantities in 1946. Dried fish exports increased only from 12,393 tons in 1946 to 13,503 tons in 1947, while "klipp-fisk" increased from 27,270 tons to 45,335 tons.

In 1947, there was exported 85,389 metric tons of fresh herring as compared with 55,828 metric tons during 1946. On the other hand, there was a decrease in exports of salt herring, from 101,387 tons in 1946 to 92,873 in 1947. Exports of herring meal and fish meal were reduced from 9,473 tons in 1946 to 7,145 tons in 1947.

Canned Fish: During 1947, 33,809 metric tons of canned fish were exported as compared with 26,022 metric tons in 1946 and 36,111 metric tons in 1939. The canned fish exports in 1947 were comprised chiefly of:

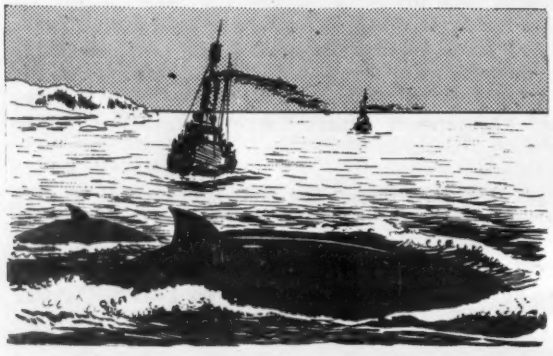
	Metric tons	Value ($)
Smoked brisling sardines in oil	12,701	8,900,000
Kippered herring other than in oil or tomato sauce.	7,985	3,500,000
Smoked small herring in oil	5,546	3,700,000
Crayfish and shell fish	2,418	3,000,000
Other	5,159	3,600,000
Total	33,809	22,700,000

Exports during 1947 went primarily to the following countries:

	Metric tons	Value ($)
United States	7,910	5,000,000
United Kingdom	11,184	8,800,000
Australia	3,517	2,000,000
Union of South Africa	2,242	1,500,000
Belgium	1,558	1,000,000
Other	7,398	4,400,000
Total	33,809	22,700,000

Exports of cod liver oil, which had increased considerably in 1946, continued to rise in 1947, but less steamed medicinal oil was exported than in 1946--2,713,000 gallons as compared with 2,796,000 gallons.

Frozen Fish: In October 1946, the company "Norsk Frossenfisk" was formed to encourage production and export of frozen fish, and now includes all Norwegian fish freezing plants. During 1947, exports of frozen fish, chiefly fillets, were valued at $7,243,461 and efforts are being made to increase production and export. There was a large increase in exports of frozen halibut, from 813 tons in 1946 to 2,655 tons in 1947.



Whaling: During the season 1946-47, Norway had 7 floating factories on the whaling grounds in the Antarctic. With the floating factories were a total of 57 killer boats. In addition, operations were conducted from the land station in Husvik Harbor on South Georgia from which 6 whaling boats operated. Whaling conditions were unusually favorable.

The Norwegian production of whale oil for the season 1946-47 was 980,000 barrels of oil and the total value amounted to $66,800,805, the largest return ever obtained from a season's whaling in the Antarctic. The value of the production of the preceding season, 1945-46, was approximately $24,144,869.

The whaling companies, however, did not receive the full value for the total catch in 1946-47. From the total amount, a price equalization fee to the Norwegian State must be deducted.

The following table shows a comparison of the Antarctic whaling operations, by Norway and other countries, for the season 1946-47.

Country	Whales Caught	Oil Produced Bbls.	Land Stations	Floating Factories	Killer Boats
Norway	12,530	979,913	1	7	63
England	9,878	728,752	1	4	50
Holland	770	77,310	-	1	8
Argentina	857	47,830	1	-	6
USSR	386	35,000 1/	-	1	8
Japan	1,175	73,295	-	2	12
Total ...	25,596	1,942,100	3	15	147

1/Approximate figure.

Portugal

DEPARTURE OF COD FISHING FLEET: The Portuguese cod fishing fleet assembled at Lisbon in April for impressive and picturesque ceremonies prior to its departure for the Newfoundland Banks. According to local press accounts, some 59 vessels, mostly three-masted schooners with auxiliary motors, were to leave Lisbon for the Great Banks. This is the largest number of fishing vessels ever sent out of the Tagus to the Banks. Most of the units are of modern construction as a result of the considerable effort made by the Portuguese in recent years to develop the cod fishing fleet. A decade ago, the annual catch made by Portuguese cod fishing vessels supplied about 20 percent of the domestic consumption; this year, it is predicted that of the current domestic consumption of approximately 60,000 tons annually, the domestic fisheries will furnish about 50 percent with the remainder being imported from Norway and Newfoundland.

Union of South Africa

NEW CANNING AND FISH MEAL PLANT: A new factory of one of the associated companies of the Fisheries Development Corporation of South Africa has been completed and put into operation. The plant can treat 10 tons of raw fish per hour, producing a high-grade fish meal and fish oil, according to a report by the American Consulate General at Cape Town, South Africa. On completion, the company's plant will have a capacity in excess of 300 short tons of pilchards a day for canning and for the manufacture of oil and meal. When working at full capacity, at the height of the pilchard season, the oil and meal plant has a potential output of 40 short tons of meal and 6,000 gallons of oil a day. During 1947, the company has produced approximately 2,750,000 pounds of canned fish, mostly pilchards and mackerel.

OYSTER CULTURE: The Fisheries Development Corporation of South Africa, Ltd., have continued investigations into the possibility of oyster culture at Knysna. Some 50,000 oysters were put down and those that have survived the removal and the

attacks of enemies such as "mussel-crackers" and whelks, have shown very good growth. The indications are that oysters can be grown successfully in the lagoon. The site in the Keurbooms Lagoon was abandoned as unsuitable.

FROZEN CRAWFISH: An agreement has been concluded among local exporters of crawfish (spiny lobster) tails whereby this commodity will be sold through one channel, the South African Frozen Rock Lobster Packers' Association, and exports to the United States will be handled by that Association through its American representative. The gross return from markets abroad will be pooled and averaged among exporters, thus avoiding an excess of selling pressure on any one market. Further, by placing distribution in the hands of a single organization in America it will, it is felt, be possible to obviate the position whereby the New York market was glutted while the requirements of the Middle West were left unsatisfied.

LIONS HEAD, CAPETOWN, SOUTH AFRICA

The attempt to rear crawfish at Hout Bay has been abondoned as the method found successful for rearing lobsters in America proved quite unsuitable here.

The 1947 figure for sales of frozen crawfish tails in the United States has been given as $1,700,000. The freight rate to the United States for frozen crawfish tails is $50 per ton or per 40 cubic feet.

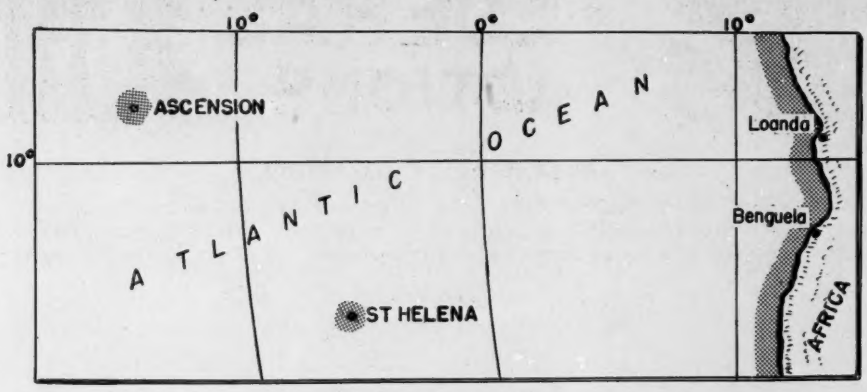
FISHERY BYPRODUCTS: Scientific research has enabled South African manufacturers to make good progress in the production of fish oil of high vitamin content, hake liver oil in malt, fish meal, fertilizers, cattle feed, and poultry oil. The value of the output of the Union's fish factories is stated to exceed $4,000,000 a year. Fish meal and fish body oils are not exported.

PRESENT CONDITIONS: The fishing and fish canning industries are developing rapidly and they have recovered the ground lost during the war years. South African fisheries are given every encouragement by the Union Government and their export trade may be expected to expand as new plants are brought into operation and new and existing harbors are developed. No canned fish are exported to the United States since it is believed that competition from California would be too strong. South African canned pilchards are, however, said to compare favorably with American brands of that product. Exports of frozen crawfish tails to the United States are now organized on a basis which should ensure wide distribution and a steady market.

ST. HELENA AND ASCENSION FISHERIES: It is understood that a Cape Town firm has obtained from the British Colonial Office concessions of fishing rights off the islands of St. Helena (between 10° and 20° South Latitude, between 0° and 10° West Longitude) and Ascension (7.53° South Latitude, 14.18° West Longitude).

The concessions cover a period of years and it is intended to erect factories on St. Helena and Ascension. Cold storage plants are believed to be already provided.

It is expected that large quantities of fish will be available, notably crawfish and tunny for canning and sharks for vitamin oils, and also heavy-weight turtles and a considerable amount of guano phosphates.

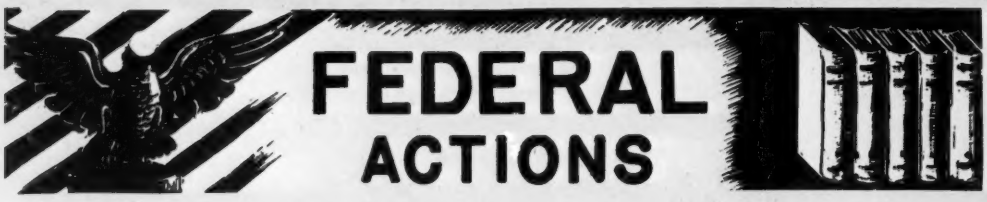


A possible source of revenue is what is known as the "black fish." Its weight does not exceed one pound but it is found in prodigious quantities and is said to be of value in the manufacture of fish meal.

CANNED FISHERY PRODUCTS AS FOOD

If full use is to be made of the nutritional value of fishery products, they must also be made appetizing. Other things being equal, the consumer may be educated to use products with the superior nutritive value, but if canned fishery products are not prepared so that the maximum of favorable appearance and flavor are retained, some more attractively prepared article of lower food value will be substituted. Canned fishery products are very appetizing if the proper attention is paid to quality and if they are attractively served. Every care should be taken to produce high quality packs and advertising programs should be directed to helping homemakers and other cooks prepare attractive and appetizing dishes.

--Fishery Leaflet 90



Department of the Army

ARMY CANNED FISH REQUIREMENTS: The tentative requirements for canned fish for the U. S. Army which will be procured through bids by the Quartermaster Corps from the 1948 pack were announced by the Department of the Army as follows:

Canned Fish (Dozens of No. 1 Cans)		
Salmon	-	857,750
Sardines	-	517,667
Tuna	-	646,781

Economic Cooperation Administration

SUPPLIES UNDER FOREIGN ASSISTANCE ACT: Procurement of supplies under the Foreign Assistance Act will be handled to the greatest possible extent through private trade channels because the reestablishment of normal trade relations is essential to world economic recovery, Paul G. Hoffman, Administrator of the Economic Cooperation Administration declared on April 29.

This statement was issued in answer to numerous inquiries received from interested American business firms desiring to participate in the European program.

Explaining procurement procedures, it was pointed out that first the governments of the participating countries will be asked to submit through the Organization for European Economic Cooperation over-all schedules of requirements, including those to be financed both with ECA funds and with their own dollar resources. These schedules will be reviewed carefully by the ECA and other interested Government agencies and revisions made where necessary to prevent undue impact upon our own economy and to make certain that ECA funds are conserved and spent only for those supplies which will contribute most to economic reconstruction and recovery.

After the schedules of requirements have been approved and arrangements made for the issuance of necessary export licenses, the participating countries will be authorized to start procurement. The countries involved, either through their Governments or private business firms will then be free to make such arrangements as they desire with private American exporters and manufacturers. American firms make their own contacts with European purchasers. While normal payments for legitimate services in connection with procurement are permitted, the ECA and other Government agencies will seek to prevent foreign purchasers from paying unnecessary or exhorbitant fees or commissions.

Private business firms in the participating countries will be able to finance specific purchases within the ECA-approved program through credits extended by U. S. Commercial banks on the basis of letters of commitment issued by ECA. How-

ever, they will be permitted to make use of these dollar credits only upon equivalent payments in their own currencies to their respective Governments or central banks.

For the time being, some Government procurement under the Foreign Assistance Act is necessary, but for this purpose the ECA is relying entirely on existing Government agencies such as the Commodity Credit Corporation, the Quartermaster Corps, and the Bureau of Federal Supply. Some of the participating countries, because of internal conditions, must temporarily at least, rely on U. S. Government procurement agencies.

Food and Drug Administration

CHANGES IN INSPECTION OF CANNED SHRIMP: The Federal Register of April 30, 1948, reported that the Food and Drug Administration, under the authority of Section 702A of the Federal Food, Drug, and Cosmetic Act, as amended, has further amended Title 21, Chapter I, Part 155--Sea Food Inspection (Inspection of Canned Shrimp). The amendment to paragraph 155.12 (b) states:

> the Commissioner of Food and Drugs may require the full amount of advance deposits prescribed for an initial inspection period by this paragraph to accompany the application of an applicant who has defaulted in payment of any advance deposit due in a prior packing season."

The second amendment to paragraph 155.12 (c) states:

> (c) A separate fee shall be paid to cover all expenses, incurred in accordance with the regulations of the Government, for salary, travel, subsistence, and other purposes incident to inspection for the purpose of issuing a certificate or warehousing or export permit on canned shrimp stored or held at any place other than an establishment to which a seafood inspector is then assigned.

CHANGES IN INSPECTION OF CANNED OYSTERS: Under the authority of Section 702A of the Federal Food, Drug, and Cosmetic Act, as amended, the Federal Register of April 30, 1948, reported that the Food and Drug Administration has amended Title 21, Chapter I, Part 155--Sea Food Inspection (Inspection of Canned Oysters). The amendment to paragraph 155.42 (b) states:

> "; except that the Commissioner of Food and Drugs may require the full amount of advance deposits prescribed for an initial inspection period by this paragraph to accompany the application of an applicant who has defaulted in payment of any advance deposit due in a prior packing season."

The second amendment to paragraph 155.42 (b) states:

> "Whenever it is determined, without hearing, by the Commissioner of Food and Drugs that an establishment having the inspection service has been damaged by wind, fire, flood, or other calamity, to such an extent that packing operations cannot be resumed before the end of the fiscal year then current, no advance monthly deposits falling due after such calamity will be required from the operator of such establishment for that fiscal year; but whenever it is determined, without hearing, by the Commissioner of Food and Drugs that an establishment having the inspection service has been so damaged by any such calamity that packing operations must be suspended temporarily and can be resumed before the end of the fiscal year then current, payment of the advance monthly deposits falling due after such calamity and before the month of resumption of operations shall be postponed until operations are resumed and thereupon shall be paid in equal monthly installments during the period between the time of resumption of operations and June 1 of the fiscal year then current: *Provided*, That in the event of a determination described in this sentence the total deposits made by the operator involved shall be charged with the cost of the service made available for the establishment, without regard to the method provided hereinafter for computing charges against deposits, and the balance of the total deposits remaining after such charges shall be returned by the Administration to the operator of the establishment after the completion of the fiscal year."

The third amendment to paragraph 155.42 (c) states:

(c) A separate fee shall be paid to ment, for salary, travel, subsistence, and warehousing or export permit on canned cover all expenses, incurred in accord- other purposes incident to inspection for oysters stored or held at any place other ance with the regulations of the govern- the purpose of issuing a certificate or than an establishment to which a sea- food inspector is then assigned.

All of the above amendments are effective on May 31, 1948.

The purpose of these amendments is to further promote the efficiency of the inspection service and to effect a more equitable distribution of the cost of the service among the participants therein.

Department of State

AGREEMENT FOR SANITARY CONTROL OF SHELLFISH INDUSTRY: The United States and Canada concluded on April 30, 1948, by an exchange of notes, an agreement to provide for cooperative efforts toward sanitary control of the shellfish industry in order to improve sanitary practices in the shellfish industries of both countries and to facilitate the exchange of information with reference to endorsement of shellfish certifications. The agreement is the result of discussions between the United States Public Health Service and the Canadian Department of National Health and Welfare, the State Department announced on May 5.

MEMORANDUM OF AGREEMENT

"In order to improve the sanitary practices prevailing in the shellfish industries of Canada and the United States, it is agreed as follows:

"1. Whatever manual of recommended practice for sanitary control of the shellfish industry is approved by both the United States Public Health Service and the Canadian Department of National Health and Welfare, will be regarded as setting forth the sanitary principles that will govern the certification of shellfish shippers.

"2. The degree of compliance with those principles obtained by the State authorities of the United States will be reported to the Canadian Department of National Health and Welfare by the United States Public Health Service, and the degree of compliance obtained by the Provincial and other competent authorities in Canada will be reported by the Canadian Department of National Health and Welfare to the United States Public Health Service.

"3. Whenever inspections of shellfish handling facilities or of shellfish growing areas are desired by either party to this Agreement, the other party will endeavour to facilitate such inspections.

"4. This Agreement may be terminated by either party giving thirty days' notice."

* * * * *

IMPROVED HANDLING OF FISHERIES AND WILDLIFE MATTERS: The following is an exchange of letters between the Department of State and the Department of the Interior with relation to the handling of fisheries matters by the two Departments:

April 5, 1948

MY DEAR MR. SECRETARY:

Following your conversation of several weeks ago with Secretary Marshall on the means for improving the handling of international fisheries and wildlife matters, there were several discussions between officials of our two Departments and an agreement was reached which, I believe, will accomplish this objective. This letter confirms the agreement.

It is my understanding that in the field of international fisheries and wildlife relations the Department of the Interior will keep the State Department advised at all times on the need for international action; will prepare on its own initiative or at the request of the State Department studies and reports on the foreign and domestic scientific and technological aspects and on the domestic economic, industrial and sports aspects of the problems; will recommend action which may be taken by the Department of State; and will advise the Department of State during international negotiations.

Since the Fish and Wildlife Service is staffed with specialists to obtain and analyze promptly and effectively information similar to that needed by the Department of State, it is agreed that there will be a substantial increase in emphasis by the Service upon keeping the Department of State informed on the need for international action and on investigating and reporting to the Department in preparation for negotiations or other international action. The effective performance of these functions by the Service will relieve the Department of such work of this character as it is presently performing. It is agreed that the Service should expand its consultation with American interests on international fisheries and wildlife matters and its activity in making recommendations on action which the Department may take on such problems.

The Department of State will shortly reorganize the fisheries work of the Department. In this connection, the Department anticipates confining its activities to the formulation and determination of general policy on and the conduct of international fisheries and wildlife relations and expects to look to other agencies for advice and guidance on other phases of the problem. It will be necessary, of course, for the Department to continue its preparation of the background work on pertinent diplomatic history and international law.

Representatives of the two Departments will, I understand, meet immediately to develop plans for regularly constituted groups of industry and state government representatives to advise the two Departments on international fisheries and wildlife matters. Although the establishment of such groups will not preclude the present practice of consulting on particular problems with groups having a knowledge of and interest in such special problems, the general groups will provide counsel which our Departments would find difficulty in obtaining by other means and which will aid our two Departments in the promotion of the general welfare in this field.

It is recognized that there exists an excellent spirit of cooperation between the Fish and Wildlife Service and the Department and that there is a high degree of flexibility in meeting the varied problems of common concern. It is understood that this agreement is not intended in any degree to formalize the relations now existing between the two organizations or to formalize the manner of handling any particular problem. Thus, while it is anticipated that the Department will, as occasion requires, participate in planning studies and investigations which may be needed for international action and will consult, from time to time, directly with State officials, industry and sports representatives, and other interested and informed persons, there is full agreement that investigation and recommendation, whether on the initiative of the Service or at the request of the State Department, is properly the initial responsibility of the Service.

I understand that your Department will try to arrange for full performance of the functions during the fiscal year 1949. However, if your Department should find it impossible to make such arrangements, it is understood that officials of our two Departments will explore the possibility of effecting special arrangements for the fiscal year 1949.

I am confident that this program and particularly the increased responsibilities by the Fish and Wildlife Service and the reorganization of the fisheries and wildlife work of the Department of State, will result in substantial improvement in the effectiveness and soundness of the handling of this country's international fisheries and wildlife affairs.

Sincerely yours,

ROBERT A. LOVETT
Acting Secretary of State

April 9, 1948

MY DEAR MR. SECRETARY:

The proposals outlined in Under Secretary Lovett's letter of April 5 for the purpose of improving the handling of international fisheries and wildlife matters which have been developed through discussions between officers of the Department of State and of the Fish and Wildlife Service of this Department are entirely acceptable.

It is my understanding that the transfer of functions and responsibilities to the Fish and Wildlife Service will proceed on a progressive basis between now and June 30, 1948, so that there will be no interruption of the important international work in which the Fish and Wildlife Service and the Department of State are involved.

I suggest that appropriate officers of the Department of State and of the Department of the Interior immediately discuss the question of obtaining funds to enable the Fish and Wildlife Service to carry on the added duties and responsibilities during the fiscal year 1949. It is understood that the Department of State will be able to transfer some funds so that the Fish and Wildlife Service can assume the additional work involved during the remainder of the current fiscal year.

I confidently hope that the handling of international fishery and wildlife matters will be facilitated by the new distribution of functions between our respective Departments.

Sincerely yours,

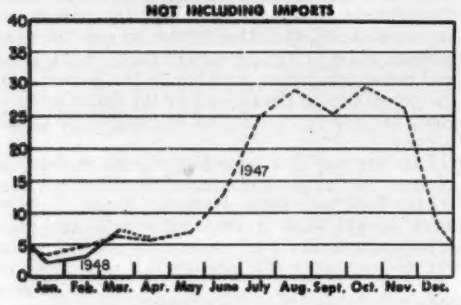
J. A. KRUG
Secretary of the Interior

LANDINGS AND RECEIPTS

In Millions of Pounds

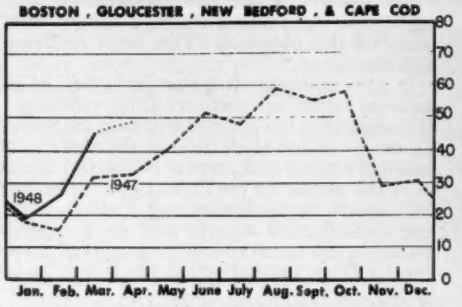
MAINE - LANDINGS

NOT INCLUDING IMPORTS



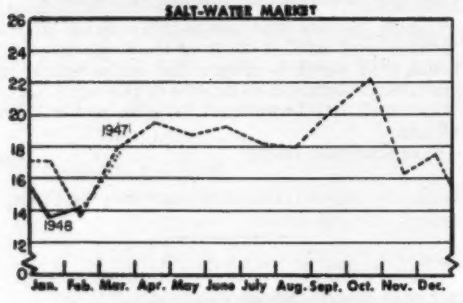
MASSACHUSETTS - LANDINGS

BOSTON, GLOUCESTER, NEW BEDFORD, & CAPE COD



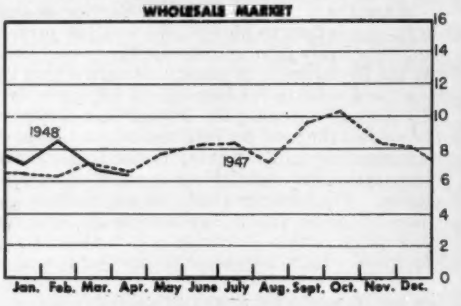
NEW YORK CITY-RECEIPTS OF FRESH & FROZEN FISH

SALT-WATER MARKET



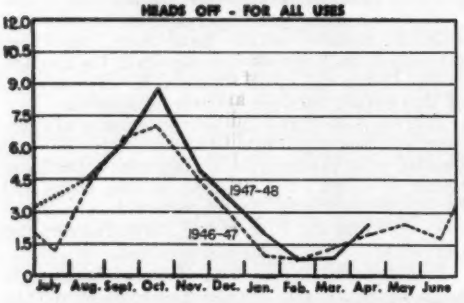
CHICAGO - RECEIPTS OF FRESH & FROZEN FISH

WHOLESALE MARKET



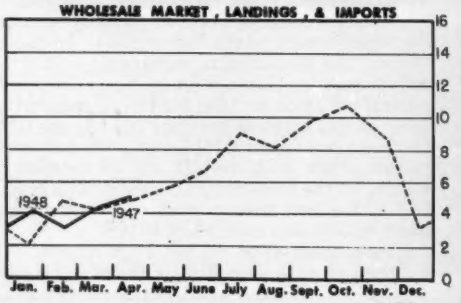
GULF - SHRIMP LANDINGS

HEADS OFF - FOR ALL USES



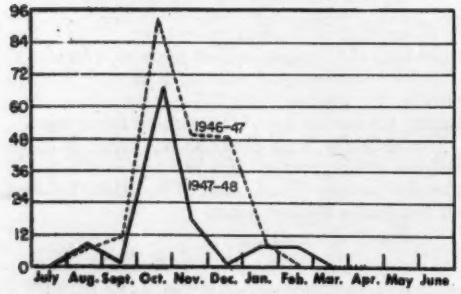
SEATTLE - RECEIPTS OF FRESH & FROZEN FISH

WHOLESALE MARKET, LANDINGS, & IMPORTS

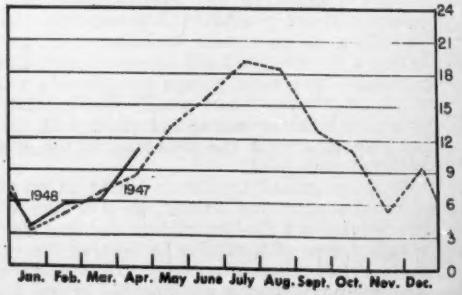


In Thousands of Tons

CALIFORNIA - PILCHARD LANDINGS



CALIFORNIA - TUNA LANDINGS

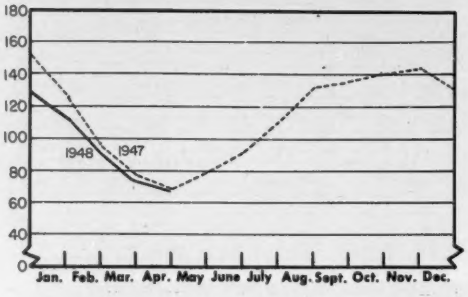


..... ESTIMATED

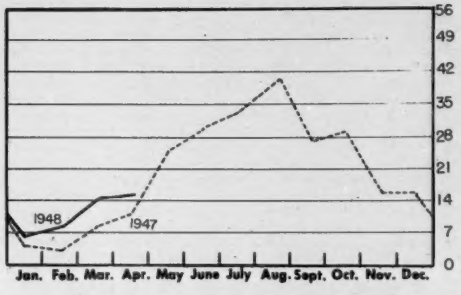
COLD STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS

In Millions of Pounds

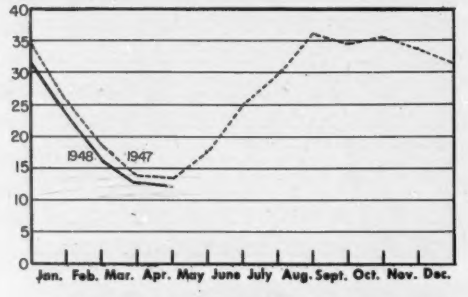
U.S. & ALASKA - HOLDINGS OF FROZEN FISH



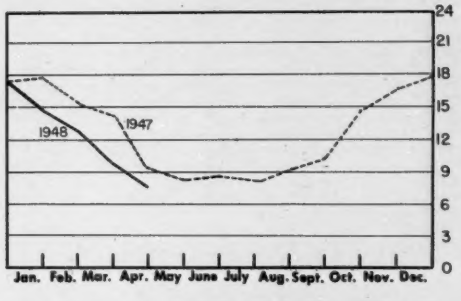
U.S. & ALASKA - FREEZINGS



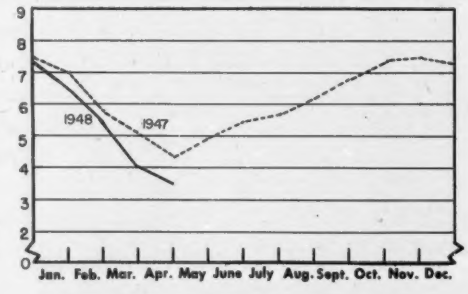
NEW ENGLAND - HOLDINGS OF FROZEN FISH



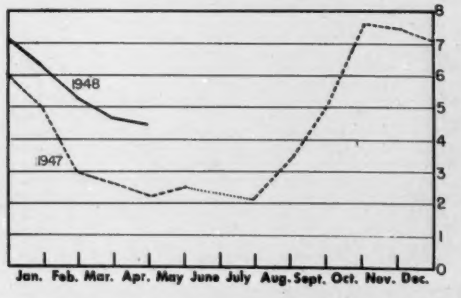
NEW YORK CITY - HOLDINGS OF FROZEN FISH



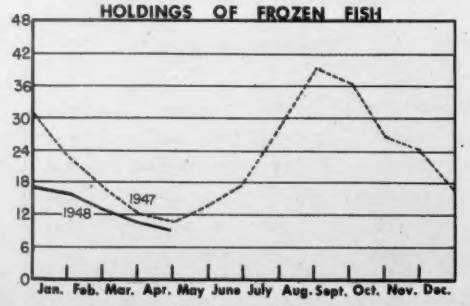
CHICAGO - HOLDINGS OF FROZEN FISH



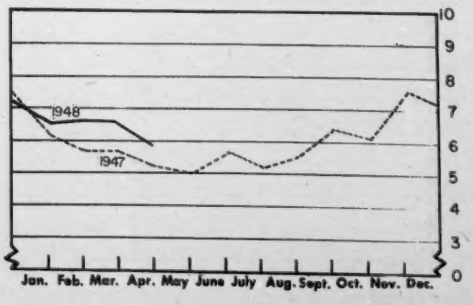
GULF - HOLDINGS OF FROZEN FISH



WASHINGTON, OREGON, AND ALASKA - HOLDINGS OF FROZEN FISH



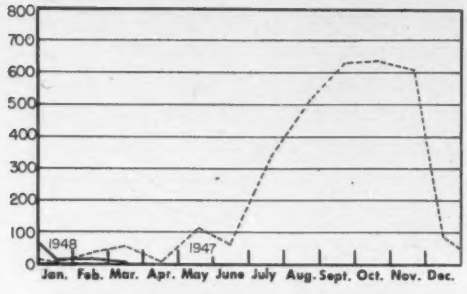
CALIFORNIA - HOLDINGS OF FROZEN FISH



CANNED FISHERY PRODUCTS

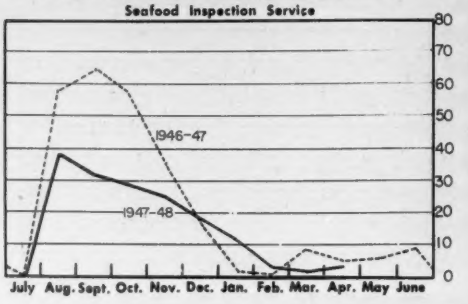
In Thousands of Standard Cases

MAINE - SARDINES, ESTIMATED PACK

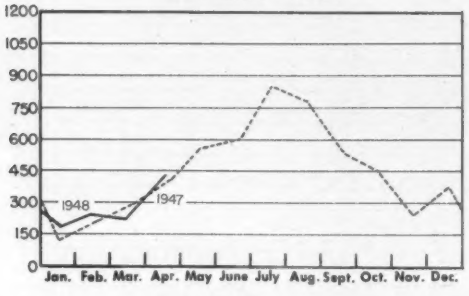


UNITED STATES - SHRIMP

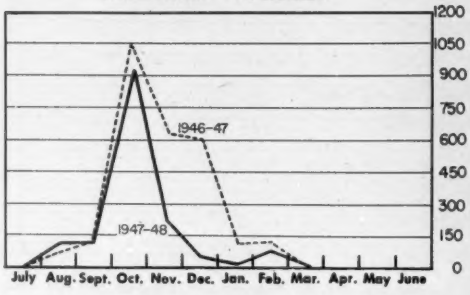
Plants under Food and Drug Administration Seafood Inspection Service



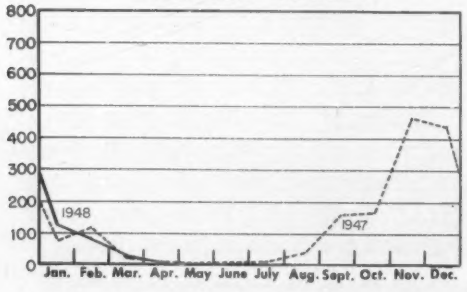
CALIFORNIA - TUNA



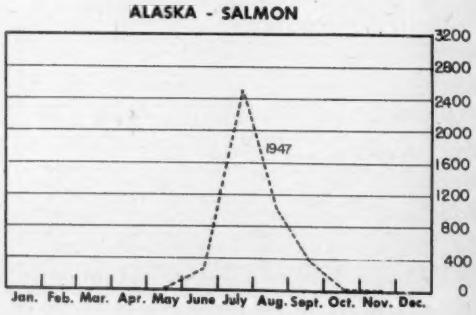
CALIFORNIA - PILCHARDS



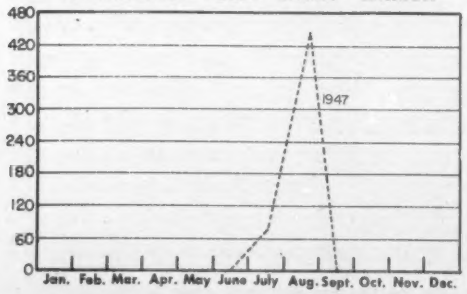
CALIFORNIA - MACKEREL



ALASKA - SALMON



WASHINGTON - PUGET SOUND SALMON



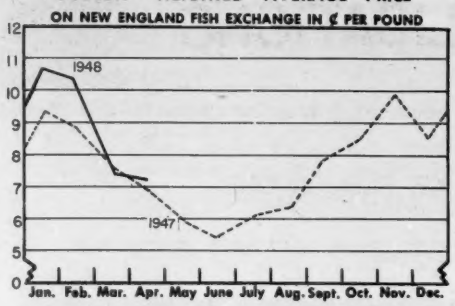
····· ESTIMATED

STANDARD CASES

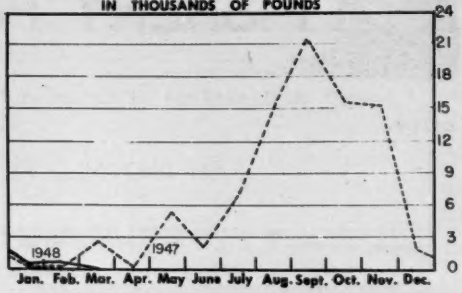
Variety	No. Cans	Can Designation	Net. Wgt.
SARDINES	100	1/4 drawn	3 1/4 oz.
SHRIMP	48	No.1 picnic	7 oz.
TUNA	48	No. 1/2 tuna	7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
MACKEREL	48	No. 300	15 oz.
SALMON	48	1-pound tall	16 oz.

PRICES, IMPORTS and BY-PRODUCTS

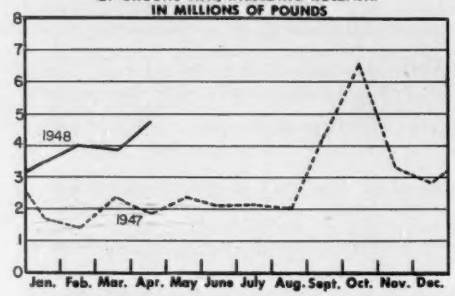
BOSTON - WEIGHTED AVERAGE PRICE
ON NEW ENGLAND FISH EXCHANGE IN ¢ PER POUND



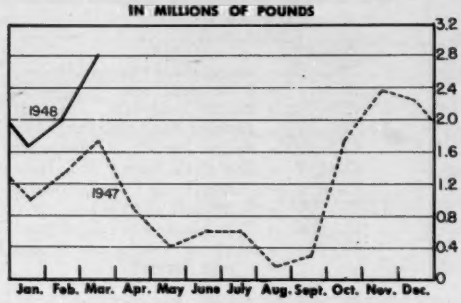
MAINE - IMPORTS OF SEA HERRING
IN THOUSANDS OF POUNDS



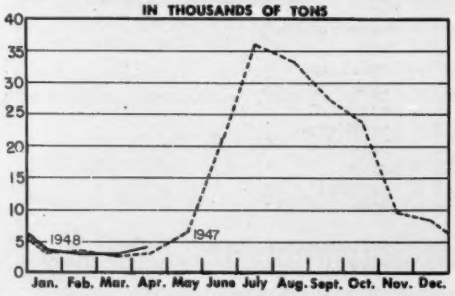
U.S. - IMPORTS OF FRESH & FROZEN FILLETS
OF GROUND FISH, INCLUDING ROSEFISH:-
IN MILLIONS OF POUNDS



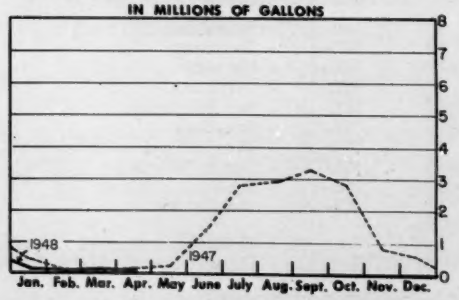
U.S. - IMPORTS OF SHRIMP FROM MEXICO
IN MILLIONS OF POUNDS

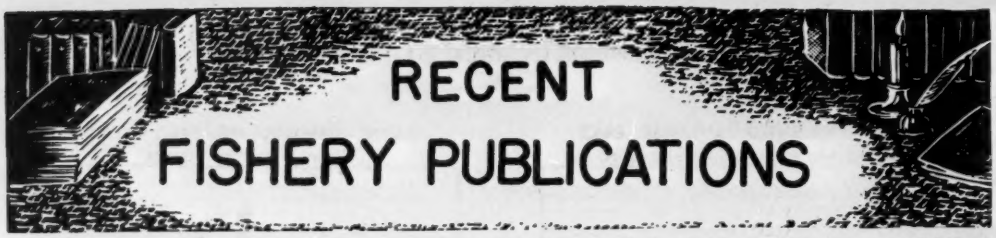


U.S. & ALASKA - PRODUCTION OF FISH MEAL
IN THOUSANDS OF TONS



U.S. & ALASKA - PRODUCTION OF FISH OIL
IN MILLIONS OF GALLONS





Recent publications of interest to the commercial fishing industry are listed below.

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
FL - FISHERY LEAFLETS.
MDL - MARKET DEVELOPMENT SECTION LISTS OF DEALERS, LOCKER PLANTS, ASSOCIATIONS, ETC.
SL - STATISTICAL SECTION LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.
SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

Number	Title
CFS-396	Massachusetts Landings, October 1947
CFS-397	Fish Meal and Oil Report, February 1948
CFS-398	Maine Landings, January 1948
CFS-399	Frozen Fish Report, April 1948
CFS-400	Maine Landings, February 1948
FL-233	The Fish Liver Oil Industry
FL-284	Cuban Frog Leg Industry
FL-285	Rosefish Recipes
FL-288	The (Japanese) Fishing Industry
FL-293	List of Fishermen's and Fish Shore Workers' Unions in the U. S., Alaska, and Hawaii
FL-298	Employment Possibilities in the Alaskan Fishing Industry
FL-294	Cuba's Spiny Lobster Industry

Lists of Refrigerated Locker Plants (Revised):

MDL-2 - Michigan	MDL-22 - Massachusetts
MDL-4 - Nebraska	MDL-23 - Rhode Island
MDL-6 - Kentucky	MDL-24 - Ohio
MDL-8 - Montana	MDL-27 - Louisiana
MDL-9 - Oklahoma	MDL-30 - North Carolina
MDL-11 - New Hampshire	MDL-31 - Oregon
MDL-13 - New York	MDL-32 - New Mexico
MDL-15 - Mississippi	MDL-34 - Missouri
MDL-16 - North Dakota	MDL-41 - Maine
MDL-17 - Kansas	MDL-42 - Maryland
MDL-21 - New Jersey	MDL-44 - South Dakota

Sep.201 - Fish Marketing in Colorado and the Development of Greater Markets
Sep.202 - Thiaminase in Fishery Products: A Review

SL-1 - Wholesale Dealers in Fishery Products, Maine, 1947 (Revised)
SL-4 - Wholesale Dealers in Fishery Products, Rhode Island, 1947 (Revised)

Lists of Firms Canning (Revised):

SL-105 - Alewives and Alewife Roe, 1946
SL-106 - Shad or Shad Roe, 1946
SL-107 - Misc. Fish and Fish Products, 1946
SL-108 - Salmon Eggs for Bait, 1946
SL-109 - Caviar and Misc. Fish Roe, 1946
SL-111 - Clam Products, 1946
SL-112 - Shrimp, 1946
SL-113 - Crab Meat, 1946

Lists of Firms Canning (Revised) (Cont.):
SL-114 - Mussels, 1946
SL-115 - Miscellaneous Shellfish and Turtle Products, 1946
SL-117 - Sea Herring, 1946
SL-118 - Groundfish Flakes, 1946
SL-119 - Squid, 1946

Lists of Firms Manufacturing (Revised):
SL-151 - Fish Meal, Scrap, Oils, Etc., 1946
SL-154 - Seaweed Products, 1946
SL-155 - Marine Shell Buttons, 1946
SL-156 - Pearl Essence, 1946
SL-157 - Fish Liver Oils, 1946
SL-159 - Fresh-Water Mussel-Shell Products, 1946
SL-160 - Menhaden Oil, Meal and Dry Scrap, 1946

MISCELLANEOUS PUBLICATIONS

THE FOLLOWING PUBLICATIONS MAY BE OBTAINED, IN MOST INSTANCES, FROM THE AGENCIES ISSUING THEM.

Havana Charter for an International Trade Organization and Final Act and Related Documents. The United Nations publication of the Final Act and Related Documents of the United Nations Conference on Trade and Employment held at Havana, Cuba, November 21, 1947 to March 24, 1948, reproduced and issued by the Office of Public Affairs, Department of State. This 77-page booklet includes the final act of the United Nations Conference on Trade and Employment, Havana Charter for an International Trade Organization, including Annexes, and lists the resolutions adopted by the Conference. Among other items, the Charter covers regulations and policies on tariffs, imports, exports, and inter-Governmental commodity agreements to be observed by member countries.

The booklet is for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 25 cents per copy.

The Smoke-Curing of Fish and the Application of a Controlled Method to the Process, by Clarence L. Anderson and Robert K. Pederson, is Technological Report No. 1, recently issued by the Technology Division, Department of Fisheries, State of Washington. A brief explanation of the principles involved in smoke-curing and a description of a modern controlled smokehouse as well as some smoke-curing processes are given in this 20-page report.

In addition to listing the advantages of the controlled smokehouse in the smoke-curing of fish, it describes smoking procedures for kippered salmon, cold-smoked salmon, hot-smoked smelt, and smoke-curing prior to canning of anchovies, salmon, smelt, oysters, razor clams, and rock clams.

This Technological Report No. 1 is for sale by the Technology Division, Department of Fisheries, Smith Tower, Seattle, Washington, for 25 cents per copy.

Procedure and Criteria with Respect to the Administration of the "Escape Clause" in Trade Agreements. U. S. Tariff Commission, Washington, D. C., 14 pp., Processed. A statement on policy prepared in response to a resolution of the Committee on Ways and Means of the House of Representatives.

The South African Tunas (A Preliminary Study of the Economic Potentialities), by C. G. Molteno, The South African Fishing Industry Research Institute, Cape Town, South Africa, 34 pp., 1948, Printed.

The Spiny Lobster and Scale-Fish Industry of British Honduras (With recommendations for its control and development), by F. G. Walton Smith and Craig A. Gathman. University of Miami Marine Laboratory, Coral Gables, Florida, 29 pp., March 1948, Processed.

Processing -- Miscellaneous Service Division

Illustrator--Gustaf T. Sundstrom **Compositors -- Jean Zalevsky and Norma D. Loeffel**

ORGANIZING AND INCORPORATING FISHERY COOPERATIVE MARKETING ASSOCIATIONS

"Organizing and Incorporating Fishery Cooperative Marketing Associations," Fishery Leaflet 277, gives the aims and principles of fishery cooperative associations as well as the procedure for organizing a cooperative association. It was prepared in the interest of fishermen, State officials, and others who may be assisting in or directing the activities of fishermen, and is intended primarily as a guide in organizing, incorporating, and operating fishery cooperative marketing associations.

Some of the subjects covered in the 106-page leaflet are fishermen's associations in general, characteristics of cooperative marketing associations, types of associations, functions which a fishery cooperative may perform, conditions or circumstances that may prompt the formation of fishery cooperative marketing associations and necessity of determining basis for establishing an association.

The leaflet contains a number of appendixes which include articles of incorporation, bylaws, suggested list of cooperative literature, the fishery cooperative marketing act, reorganization plan II of May 9, 1939, excerpt of Public Law 478--79th Congress, and name, location, and purpose of fishery cooperative associations in the United States.

Fishery Leaflet 277 may be obtained upon request, without charge, from the U. S. Fish and Wildlife Service, Washington 25, D. C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILD LIFE SERVICE
WASHINGTON 25, D. C.

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